



ESTRUTURA DE DADOS

ORDENANDO LISTAS

Prof. Dr. Daniel Caetano

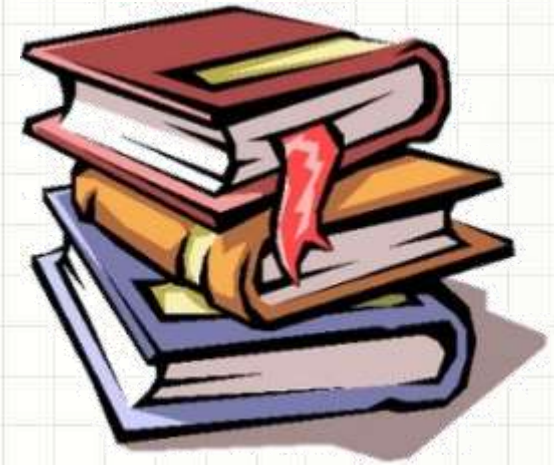
2012 - 2

Objetivos

- Compreender o que são ordenações por seleção e por inserção
- Capacitar para implementar ambos os tipos de ordenação
- **GRUPOS?**
 - Até o fim da aula!



Material de Estudo



Material

Acesso ao Material

Apresentação

<http://www.caetano.eng.br/>
(Aula 4)

Biblioteca Virtual

Estruturas de Dados – -?



RECORDANDO...

Recordando...

- Podemos criar uma lista ordenada
 - Inserindo um elemento já em seu lugar
- Podemos ordenar uma lista posteriormente:
 - Trocas (bubble sort)
 - Seleção
 - Inserção

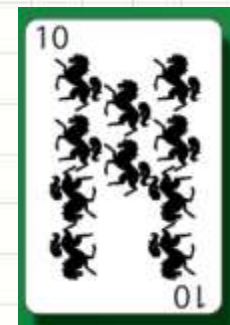
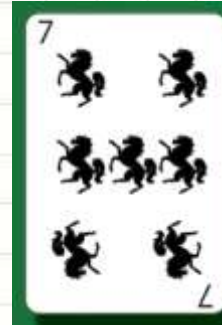
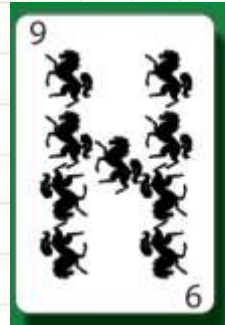
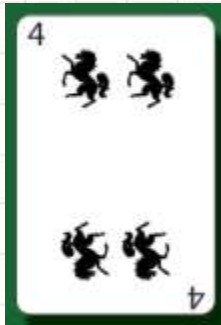


ORDENANDO UMA LISTA POR SELEÇÃO

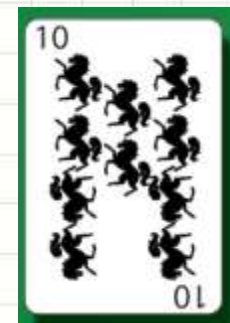
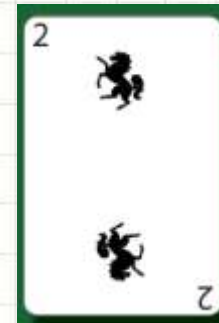
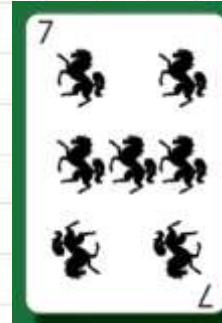
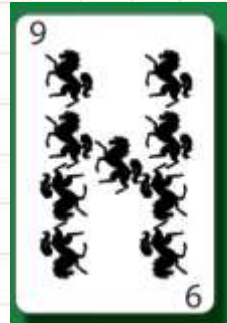
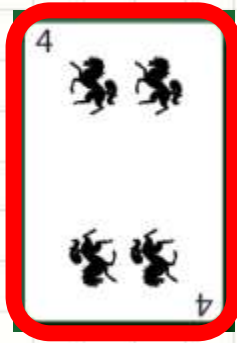
Ordenação por Seleção

- Lista 1: Lista Desordenada
- Lista 2: Vazia: Construir lista ordenada
- Procedimento
 - Buscar menor elemento da Lista 1
 - Removê-lo e inseri-lo na 1ª posição da Lista 2
 - Buscar menor elemento da Lista 1
 - Removê-lo e inseri-lo na 2ª posição da Lista 2

Ordenação por Seleção - Exemplo



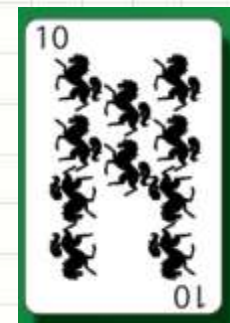
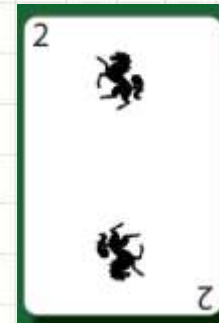
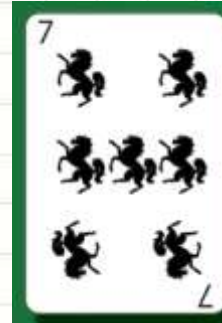
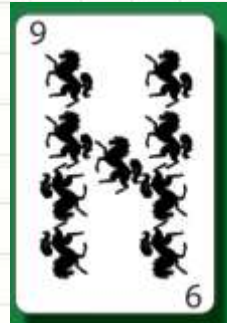
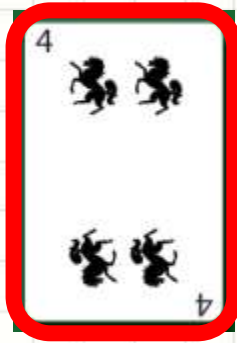
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PosMenor: ?

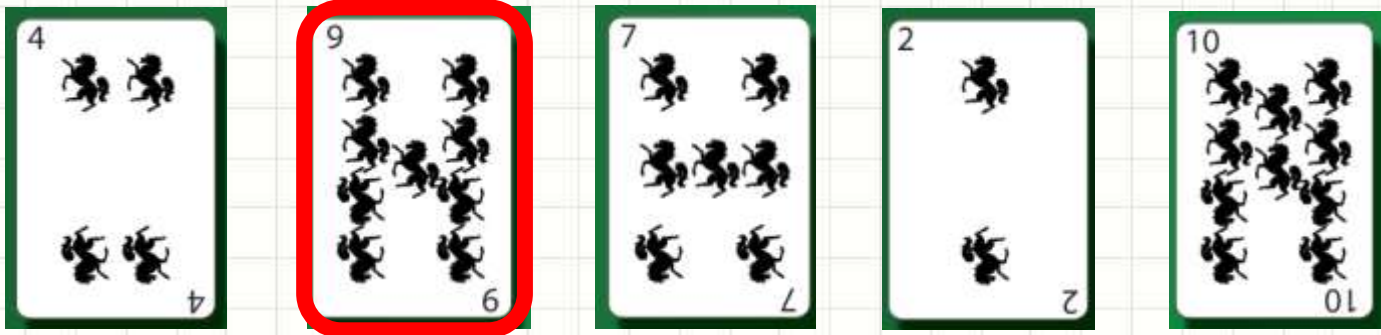
Ordenação por Seleção - Exemplo



Menor: 4

PosMenor: 0

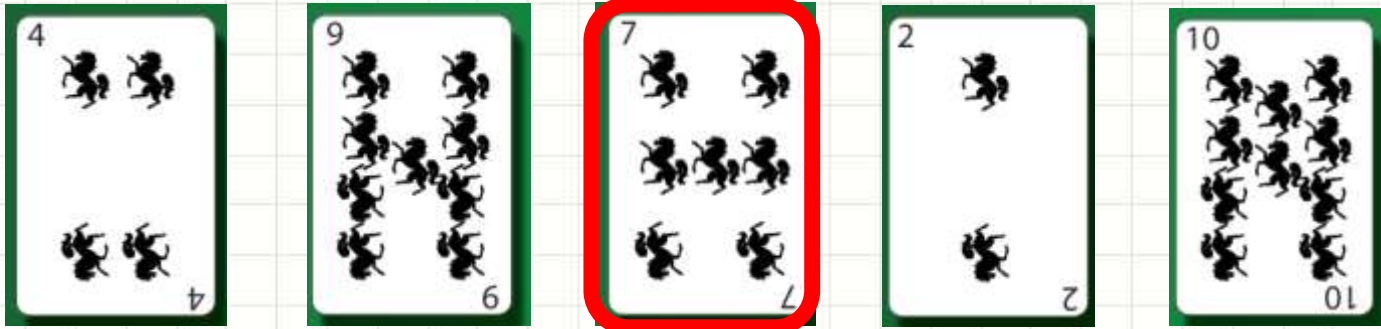
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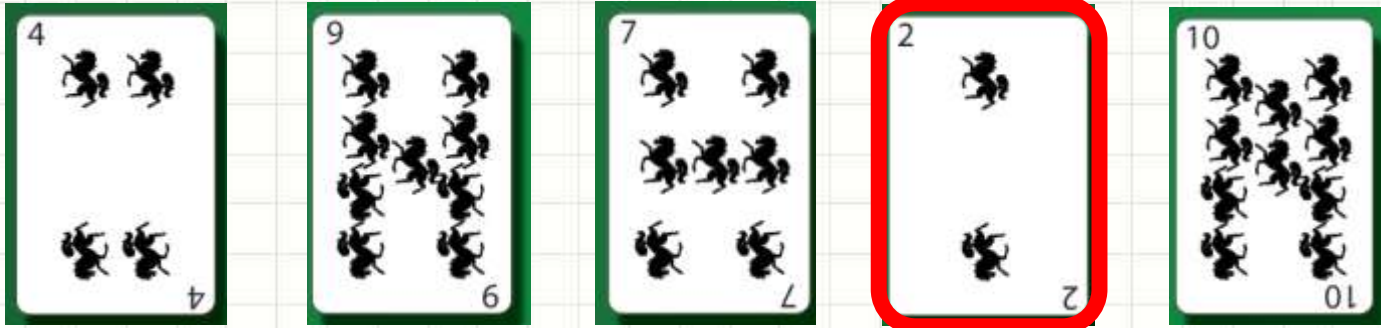
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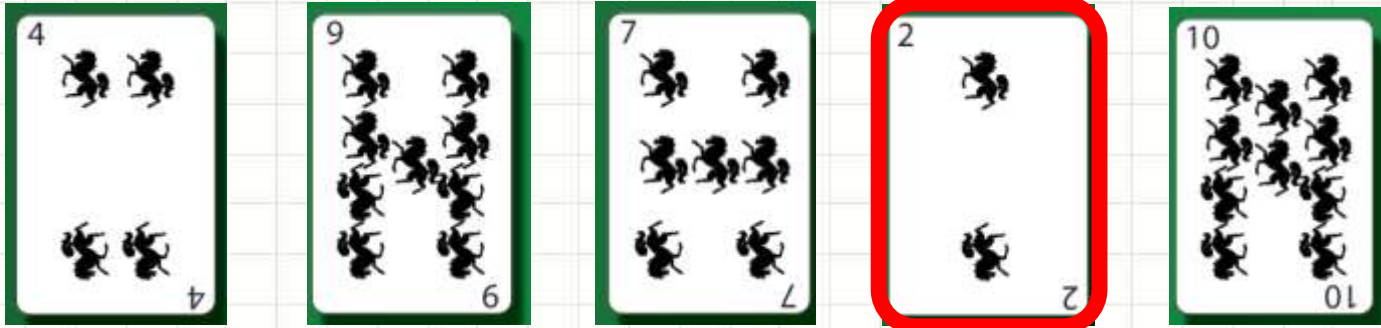
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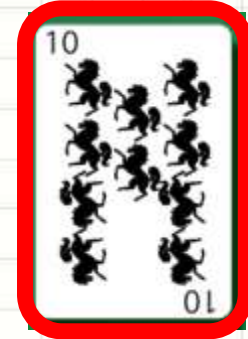
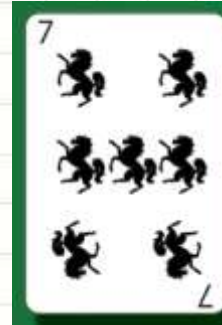
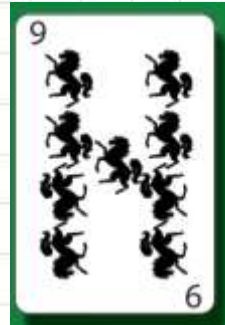
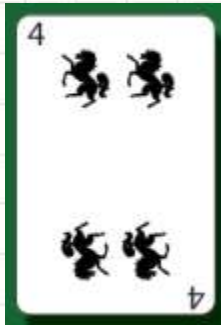
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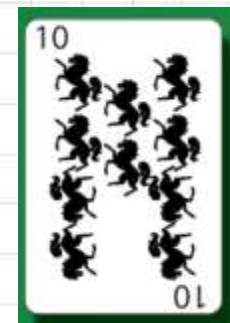
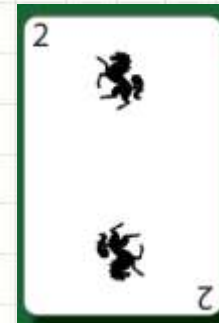
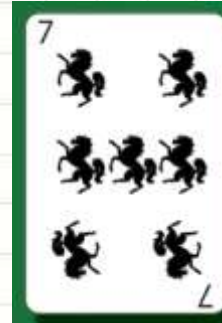
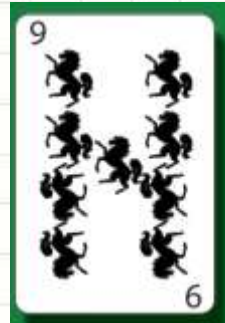
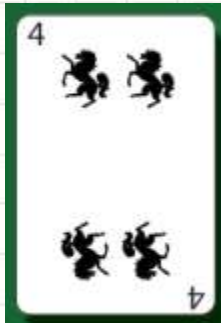
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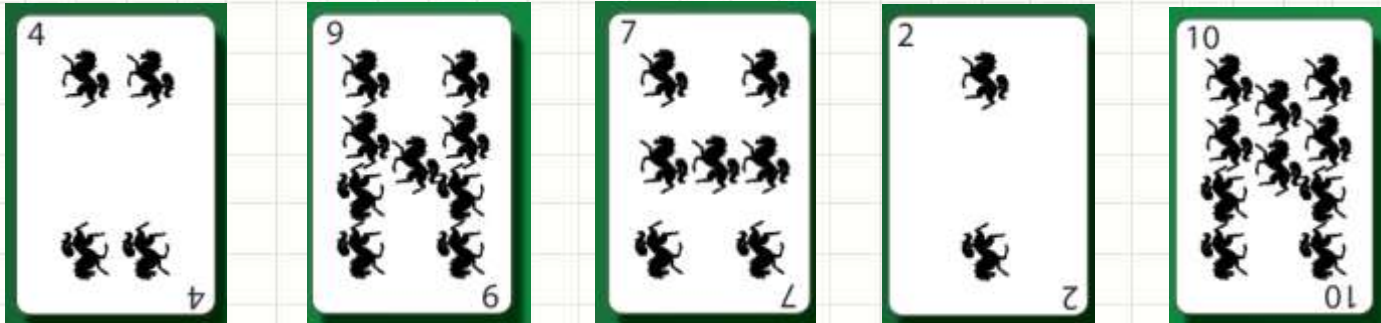
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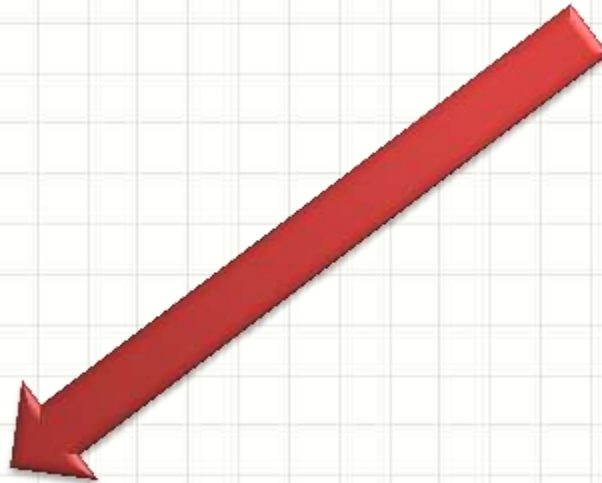
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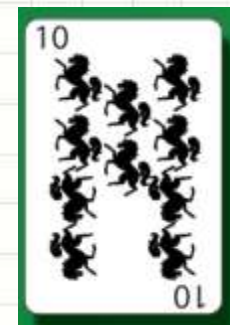
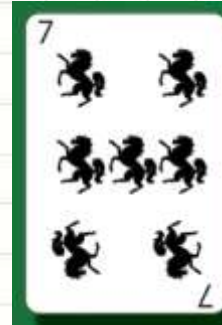
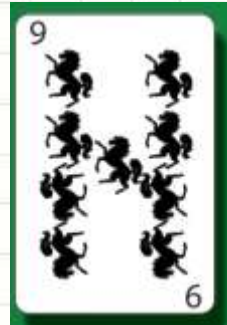
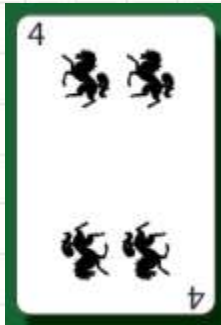
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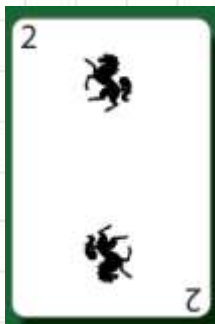
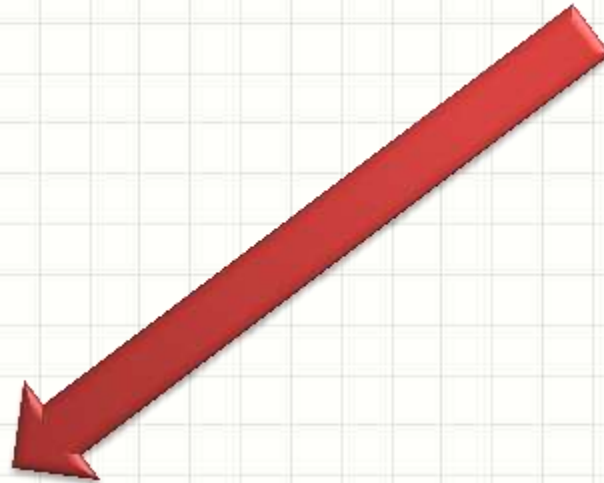
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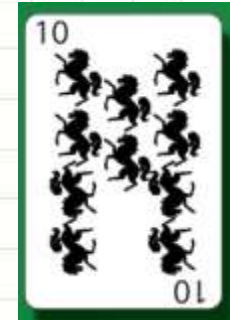
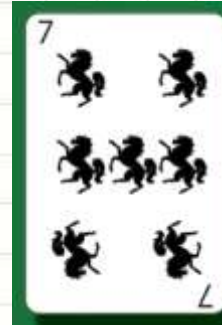
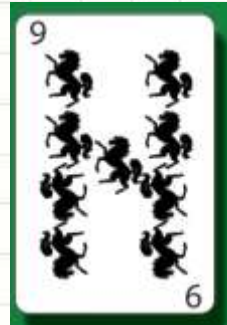
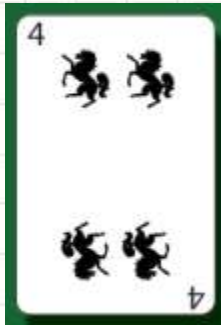
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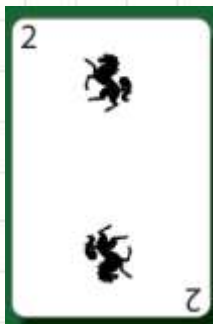
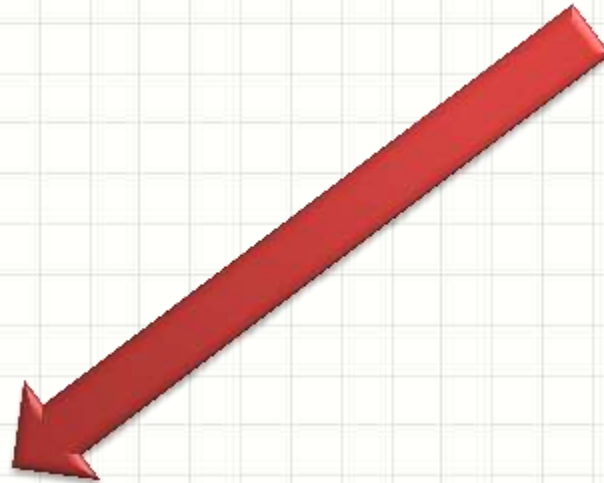
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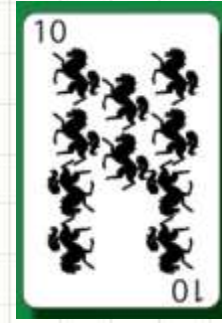
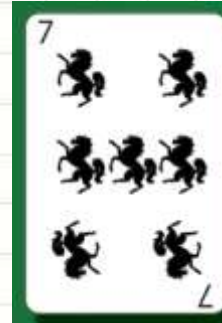
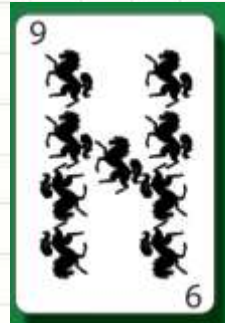
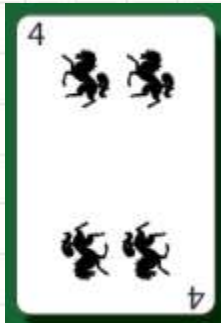
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Inserida: 0



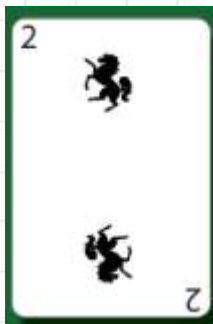
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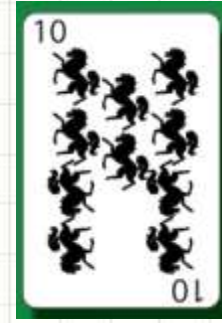
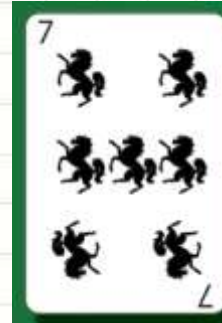
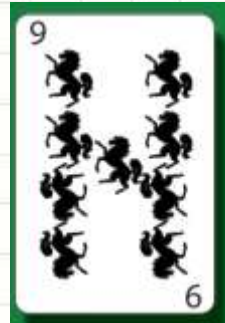
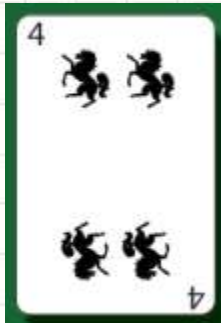
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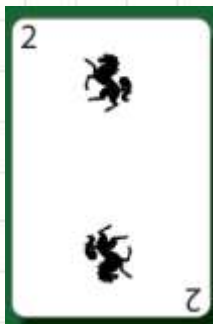
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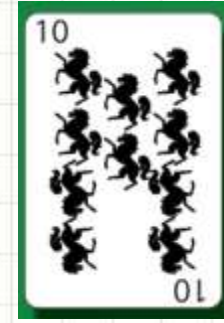
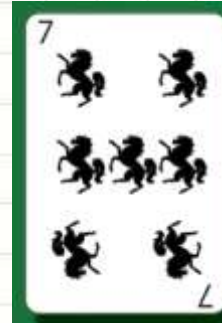
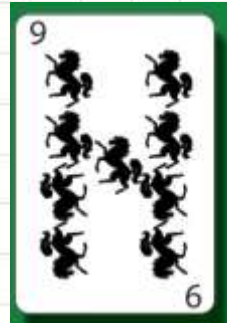
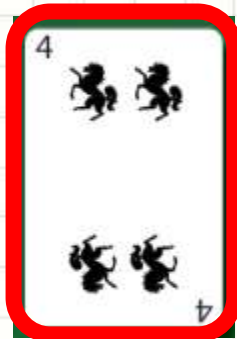
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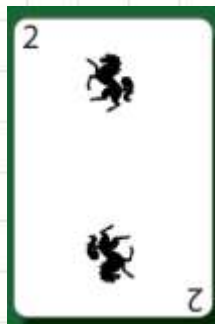
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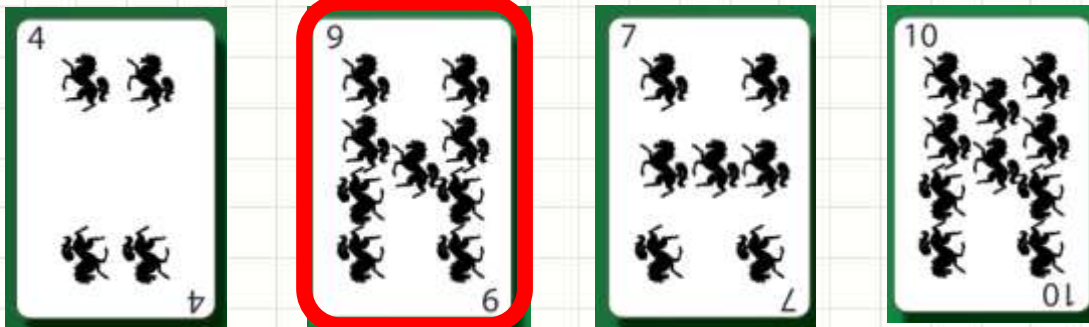
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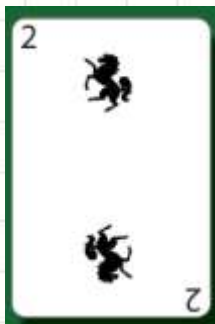
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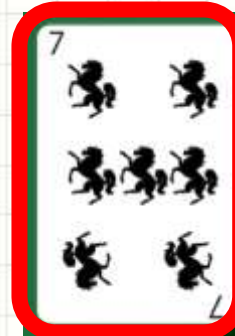
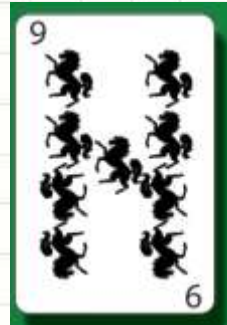
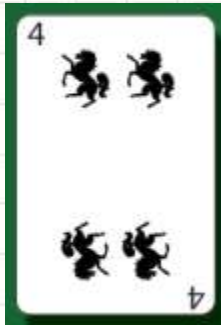
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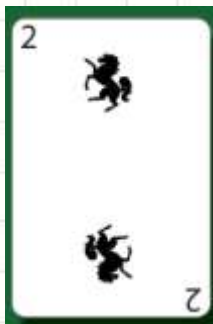
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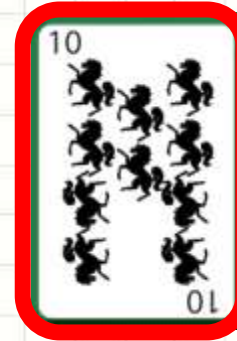
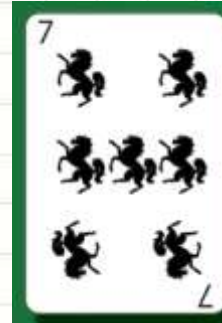
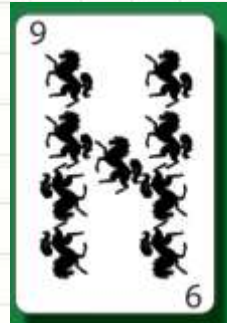
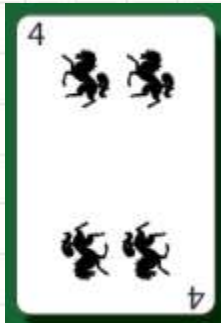
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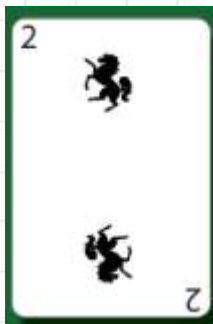
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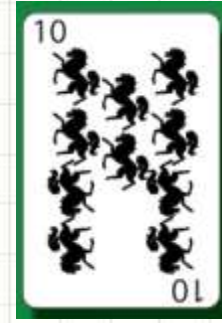
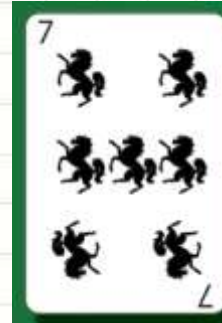
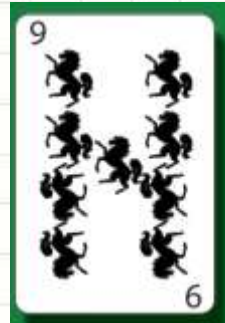
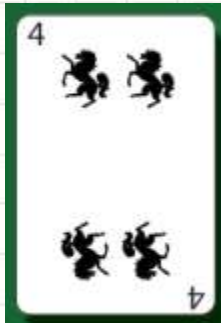
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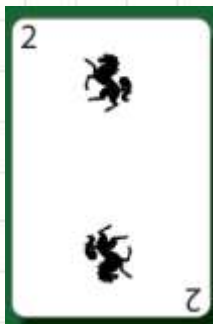
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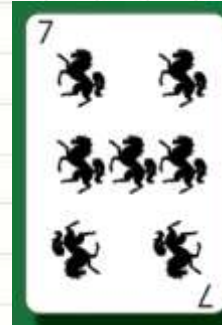
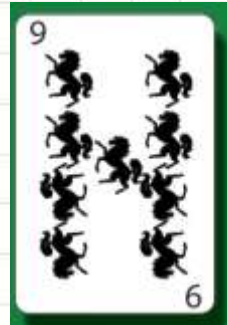
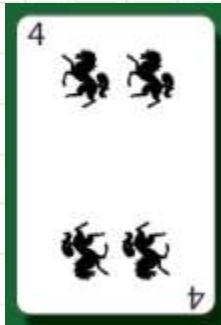
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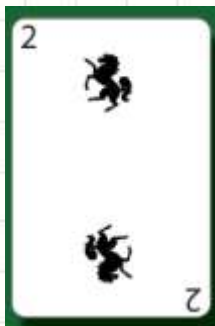
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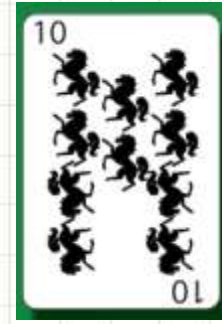
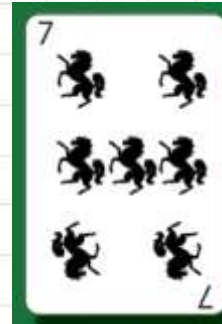
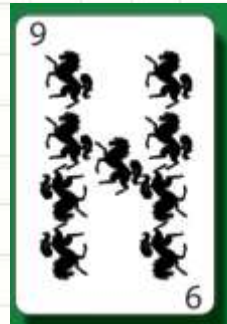
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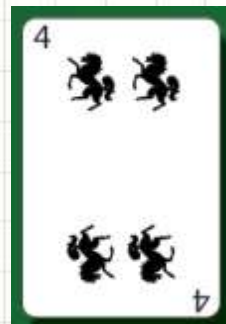
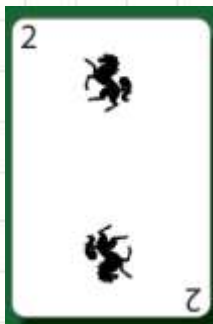
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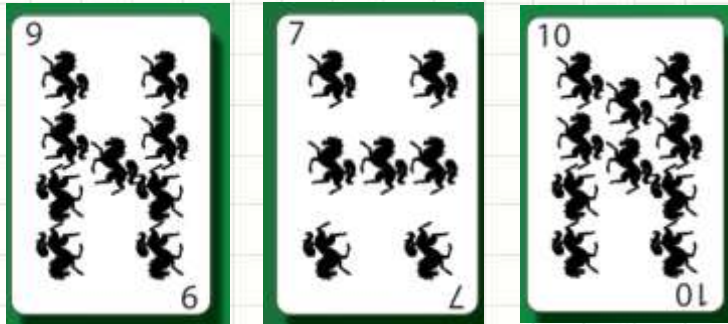
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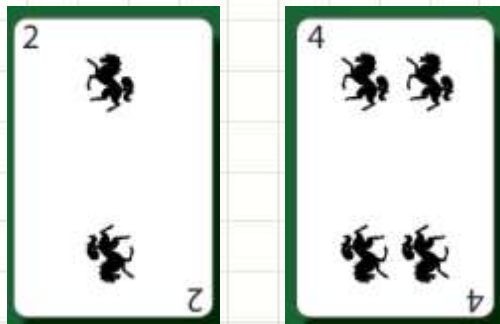
Ordenação por Seleção - Exemplo



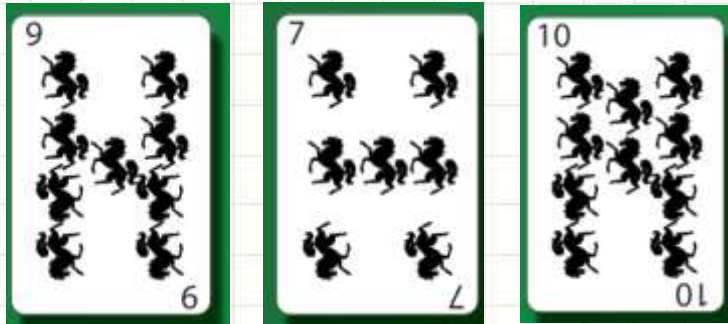
Menor: 4

PosMenor: 0

Inserida: 1



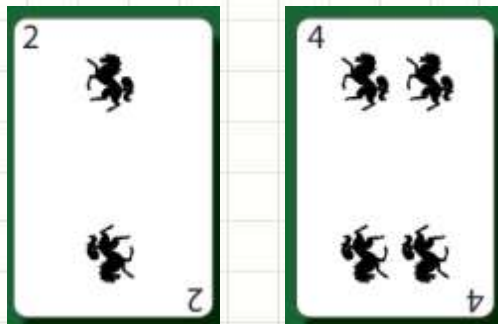
Ordenação por Seleção - Exemplo



Menor: ?

PosMenor: ?

Inserida: 1



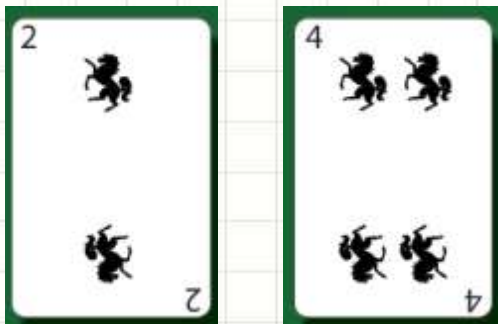
Ordenação por Seleção - Exemplo



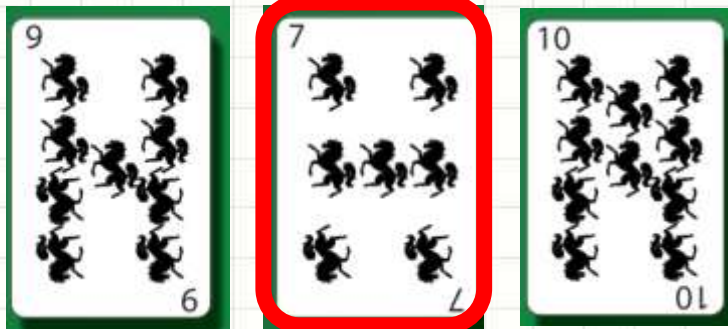
Menor: 9

PosMenor: 0

Inserida: 1



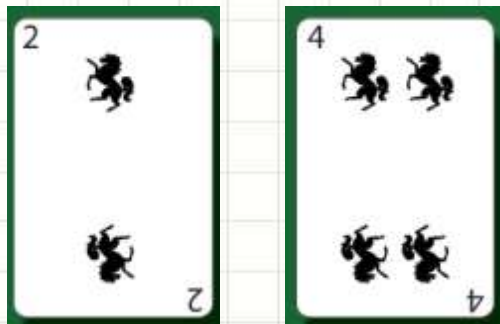
Ordenação por Seleção - Exemplo



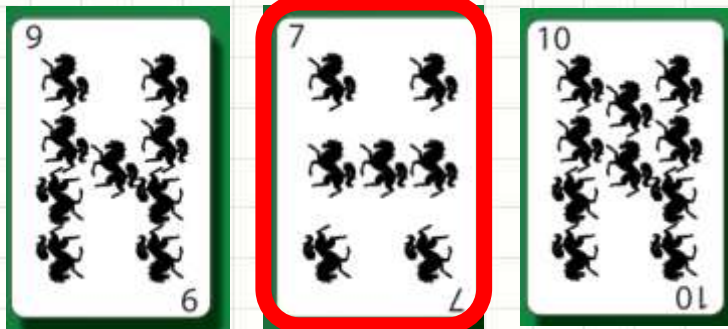
Menor: 9

PosMenor: 0

Inserida: 1



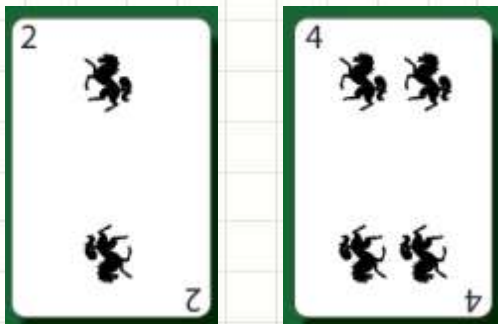
Ordenação por Seleção - Exemplo



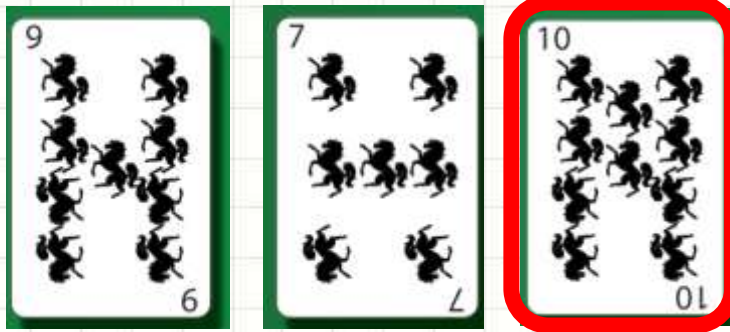
Menor: 7

PosMenor: 1

Inserida: 1



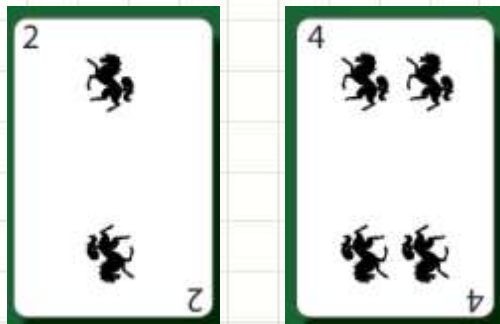
Ordenação por Seleção - Exemplo



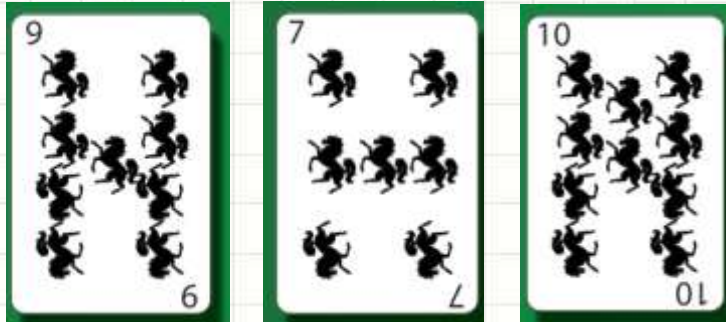
Menor: 7

PosMenor: 1

Inserida: 1



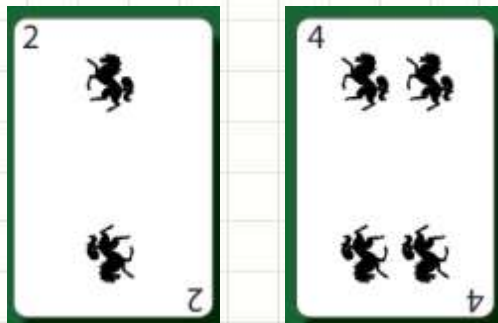
Ordenação por Seleção - Exemplo



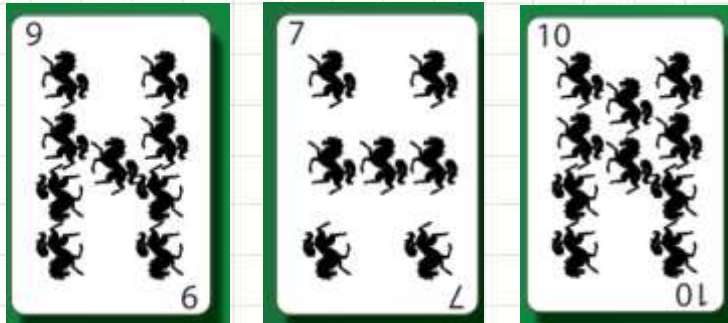
Menor: 7

PosMenor: 1

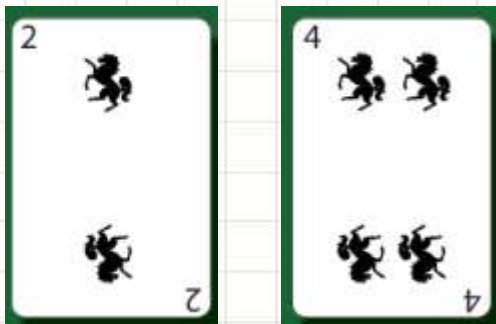
Inserida: 1



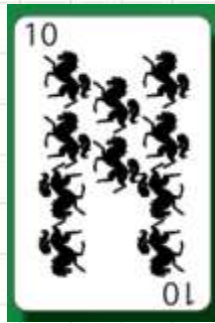
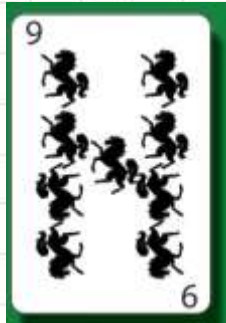
Ordenação por Seleção - Exemplo



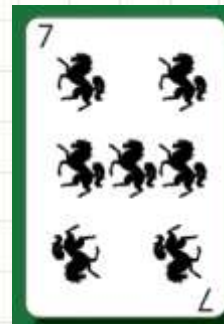
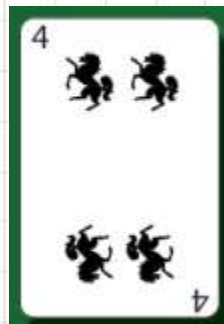
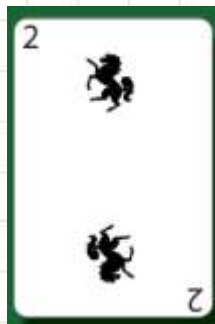
Menor: 7
PosMenor: 1
Inserida: 1



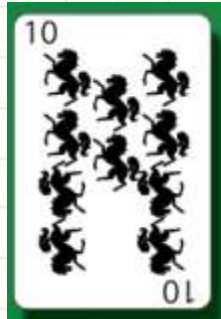
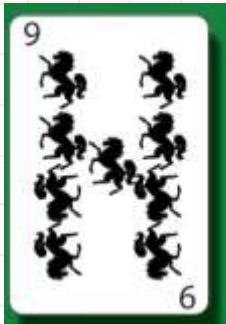
Ordenação por Seleção - Exemplo



Menor: 7
PosMenor: 1
Inserida: 1



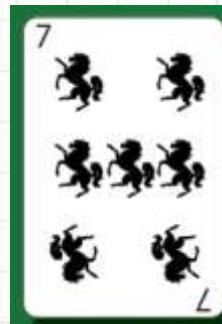
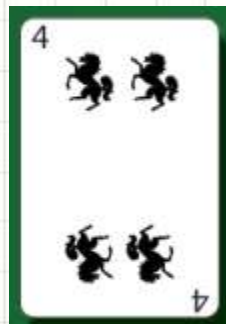
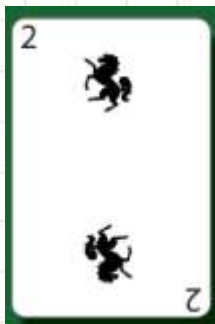
Ordenação por Seleção - Exemplo



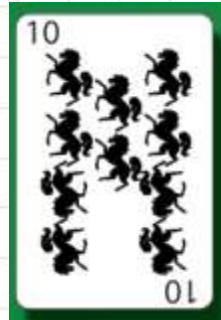
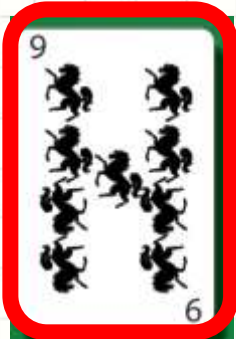
Menor: ?

PosMenor: ?

Inserida: 2



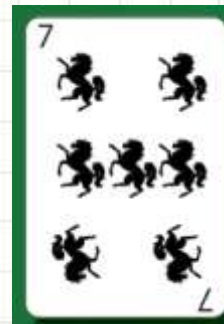
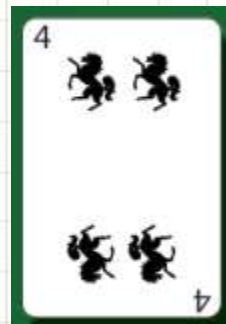
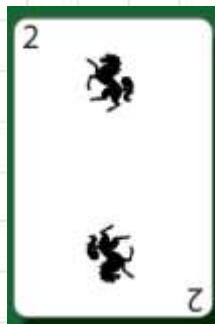
Ordenação por Seleção - Exemplo



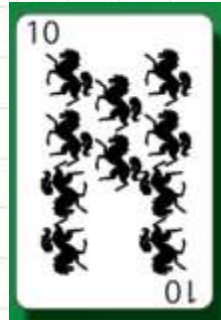
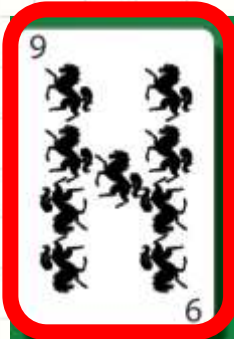
Menor: ?

PosMenor: ?

Inserida: 2



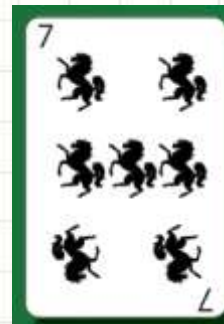
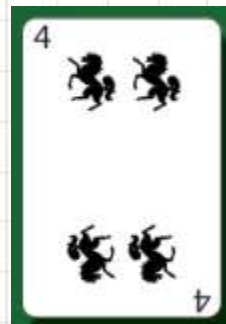
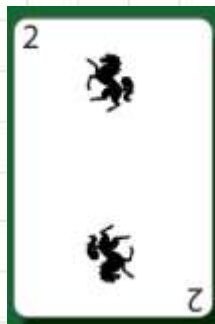
Ordenação por Seleção - Exemplo



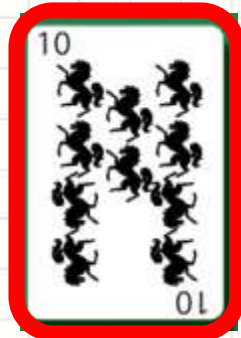
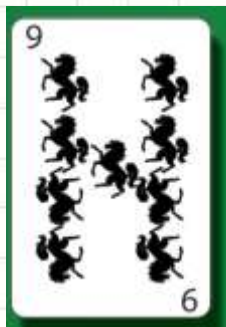
Menor: 9

PosMenor: 0

Inserida: 2



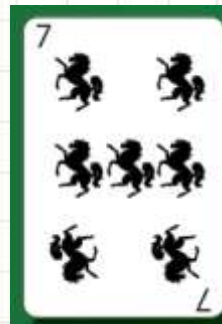
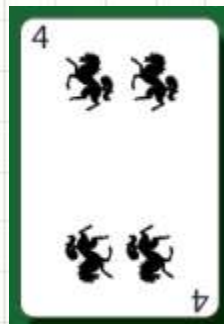
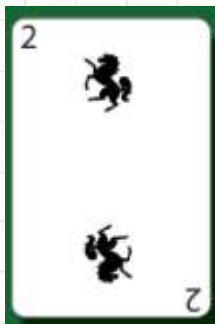
Ordenação por Seleção - Exemplo



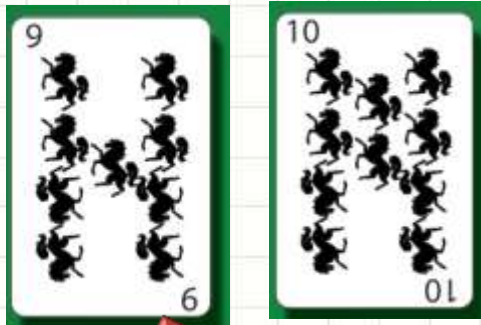
Menor: 9

PosMenor: 0

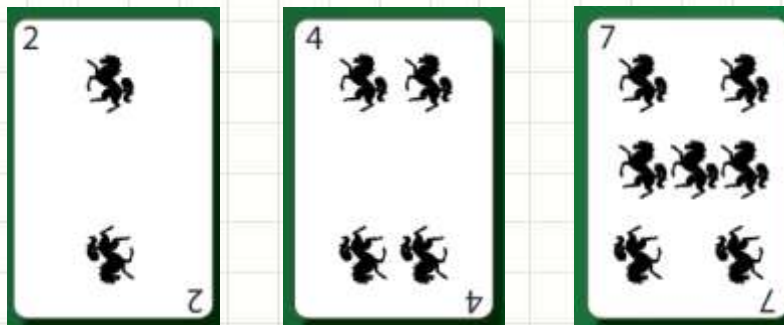
Inserida: 2



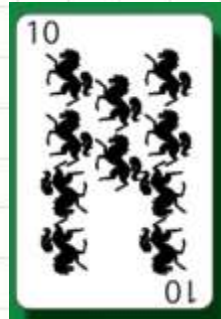
Ordenação por Seleção - Exemplo



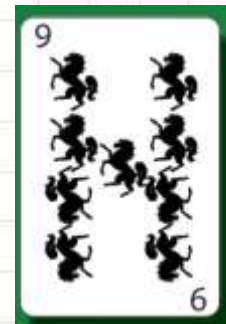
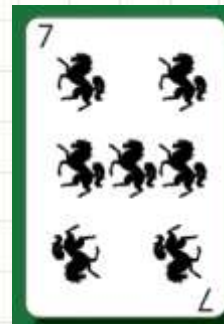
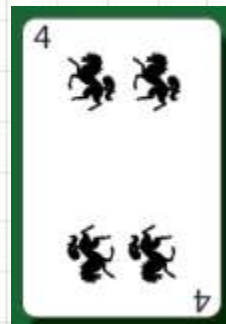
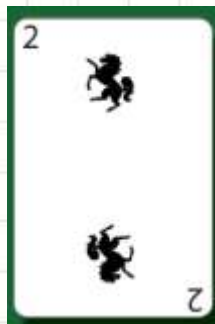
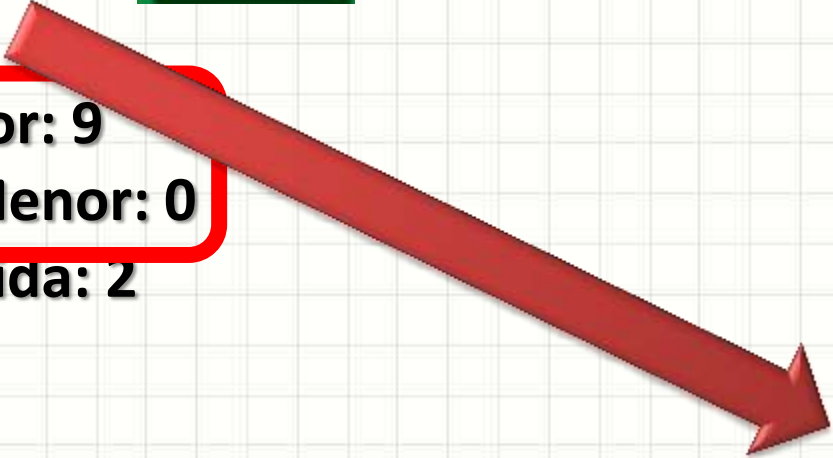
Menor: 9
PosMenor: 0
Inserida: 2



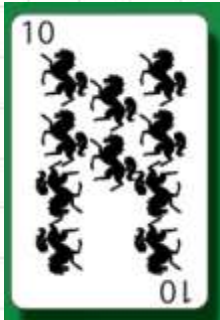
Ordenação por Seleção - Exemplo



Menor: 9
PosMenor: 0
Inserida: 2



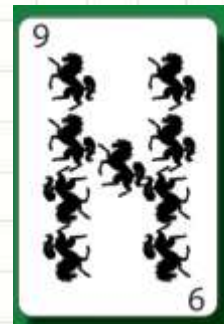
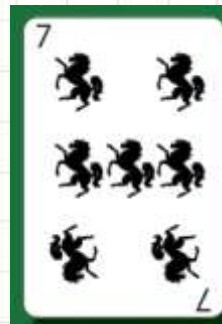
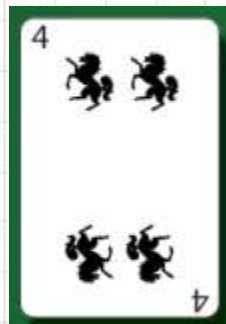
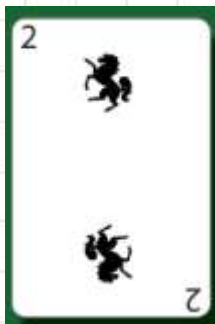
Ordenação por Seleção - Exemplo



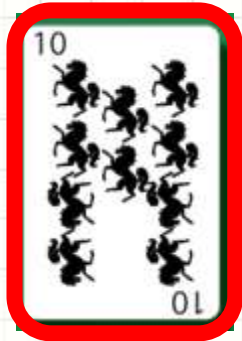
Menor: ?

PosMenor: ?

Inserida: 3



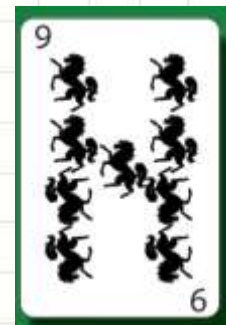
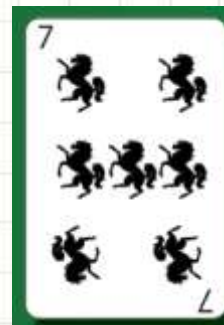
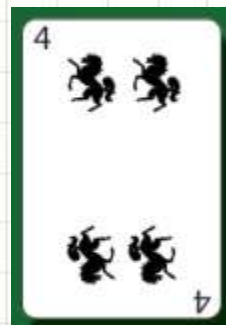
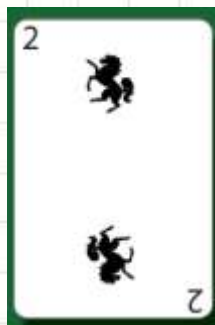
Ordenação por Seleção - Exemplo



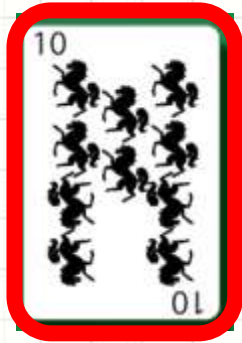
Menor: ?

PosMenor: ?

Inserida: 3



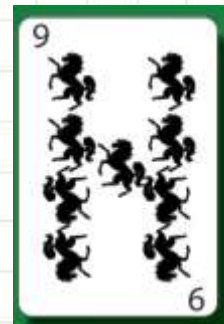
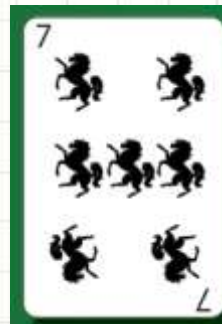
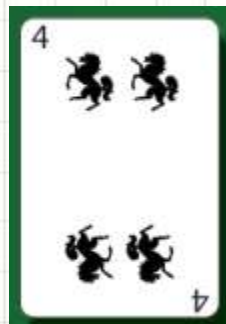
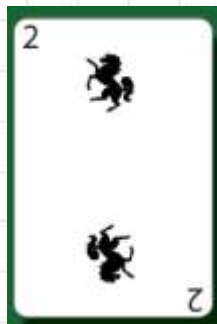
Ordenação por Seleção - Exemplo



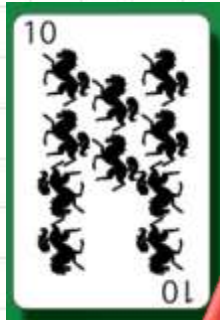
Menor: 10

PosMenor: 0

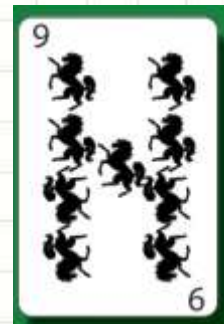
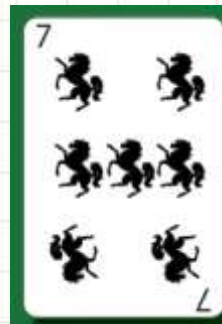
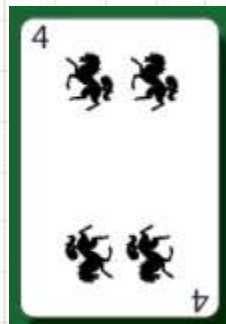
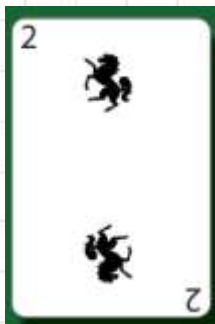
Inserida: 3



Ordenação por Seleção - Exemplo

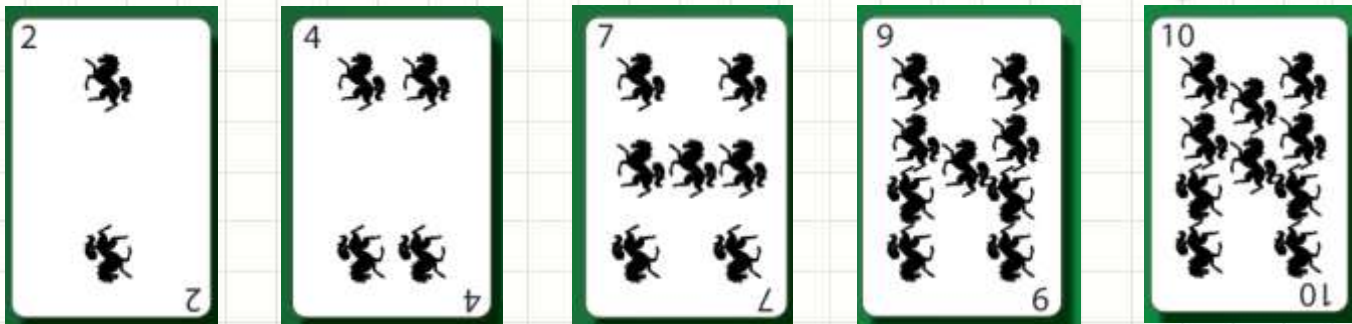


Menor: 10
PosMenor: 0
Inserida: 3



Ordenação por Seleção - Exemplo

Menor: 10
PosMenor: 0
Inserida: 3



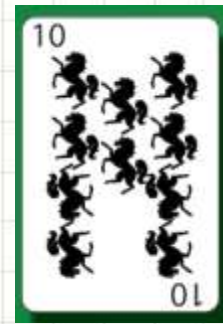
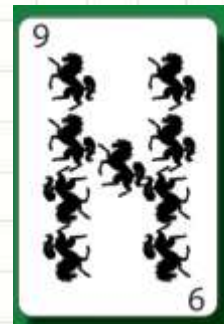
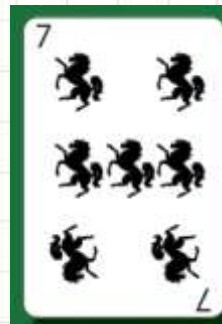
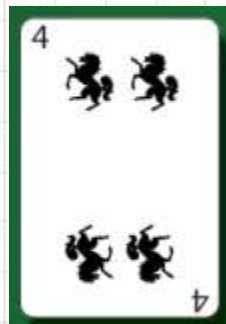
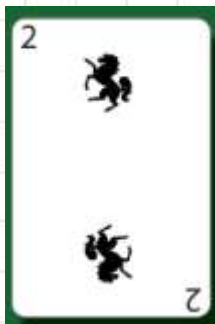
Ordenação por Seleção - Exemplo

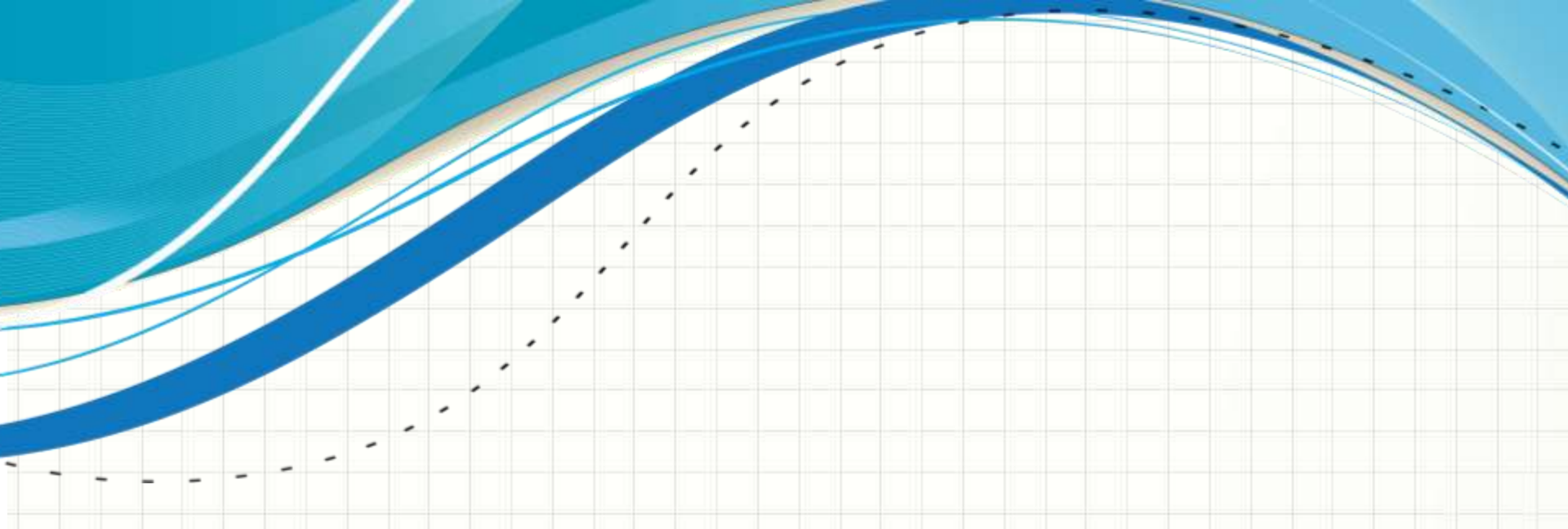
FIM!

Menor: 10

PosMenor: 0

Inserida: 3



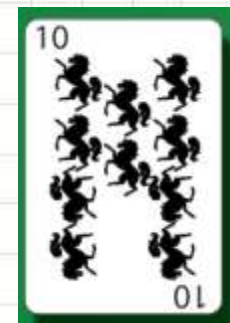
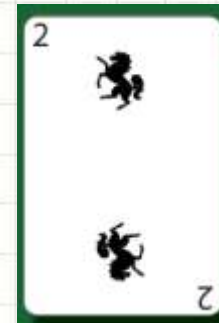
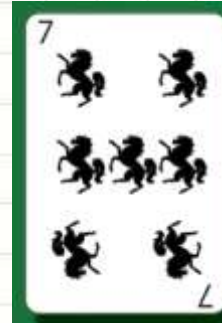
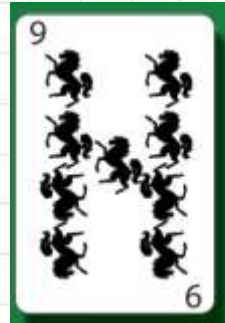
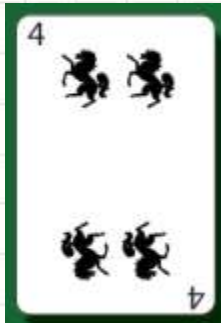


ORDENAÇÃO POR SELEÇÃO OTIMIZADA

Ordenação por Seleção

- Será que precisamos de duas listas?
- Procedimento
 - Buscar menor da Lista a partir da pos “0”
 - Trocar com o da pos “0”
 - Buscar menor da Lista a partir da pos “1”
 - Trocar com o da pos “1”
 - ...

Ordenação por Seleção - Exemplo

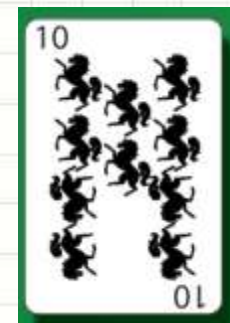
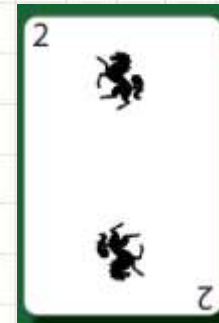
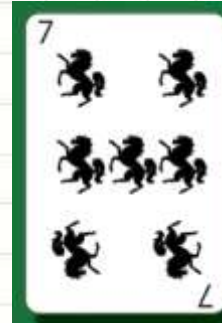
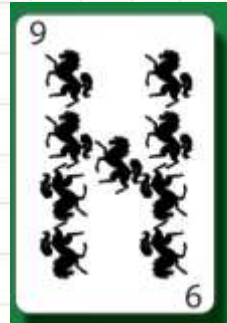
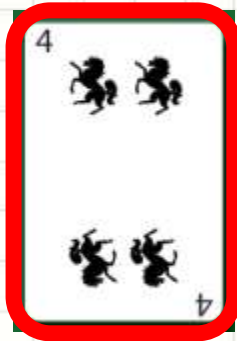


Inicial: 0

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

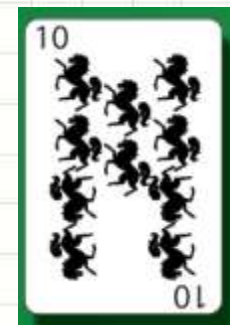
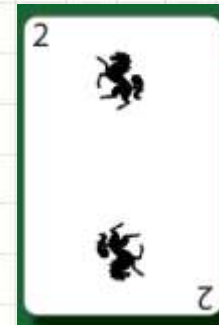
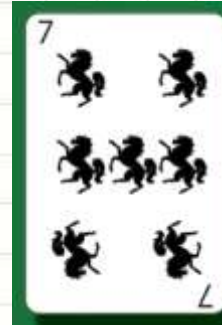
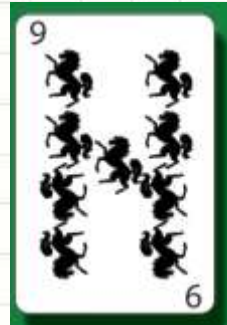
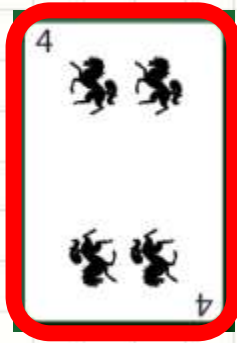


Inicial: 0

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

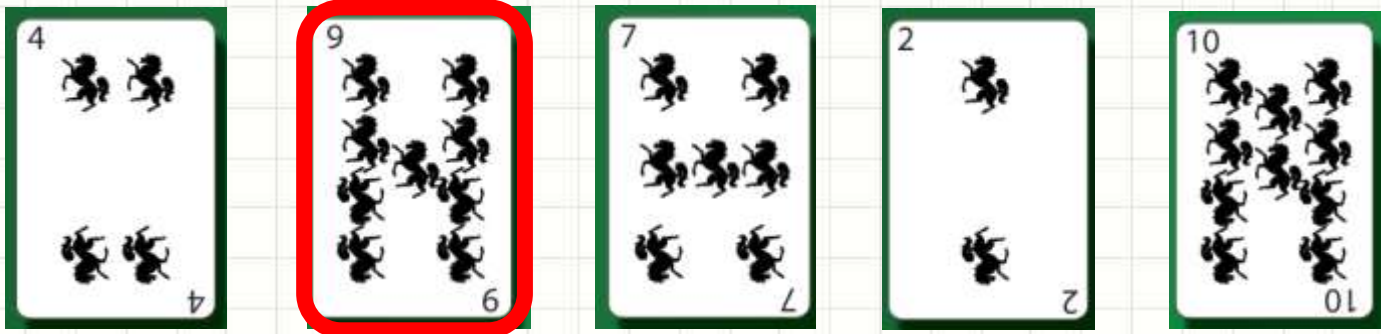


Inicial: 0

Menor: 4

PosMenor: 0

Ordenação por Seleção - Exemplo

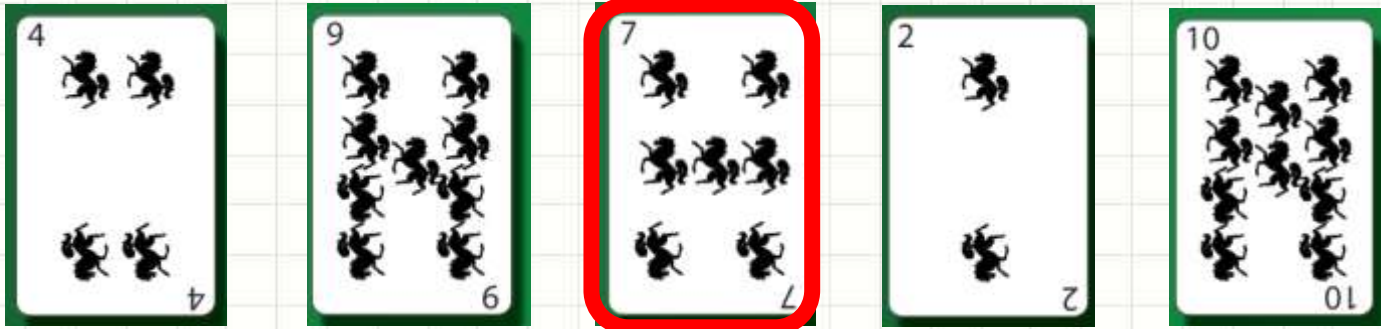


Inicial: 0

Menor: 4

PosMenor: 0

Ordenação por Seleção - Exemplo

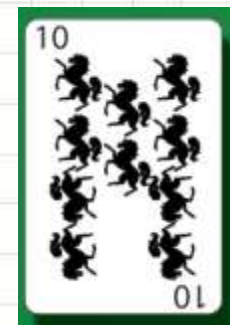
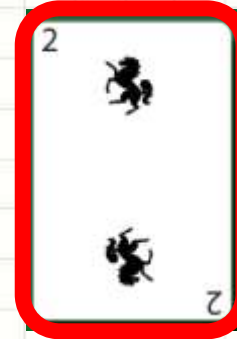
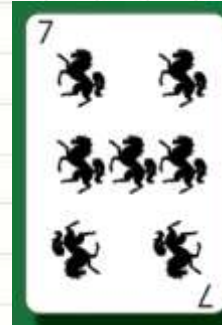
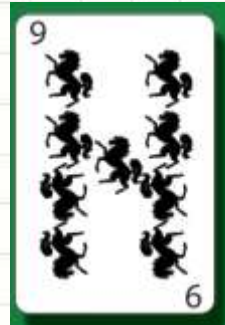
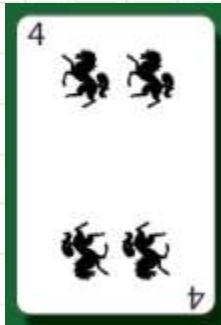


Inicial: 0

Menor: 4

PosMenor: 0

Ordenação por Seleção - Exemplo

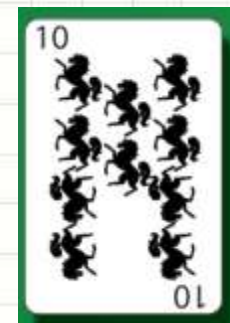
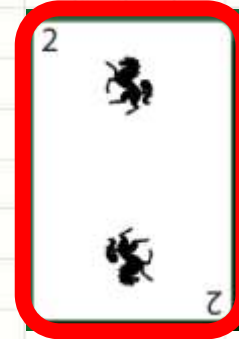
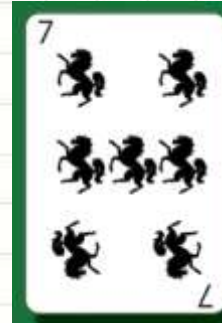
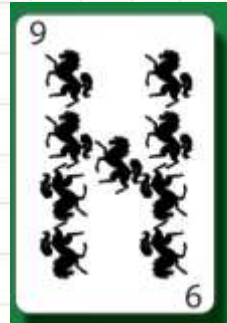
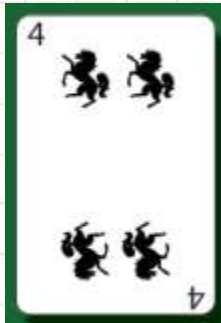


Inicial: 0

Menor: 4

PosMenor: 0

Ordenação por Seleção - Exemplo

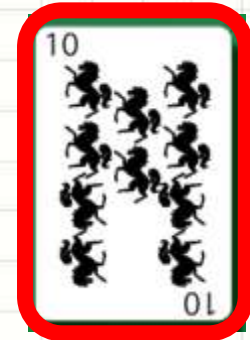
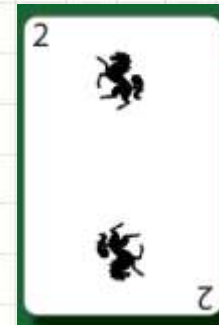
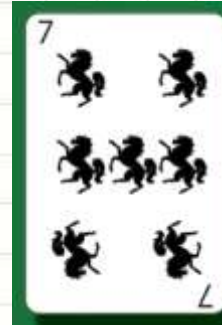
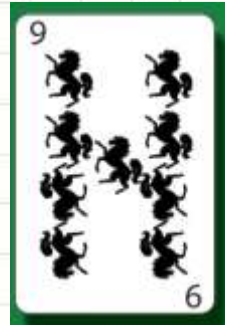
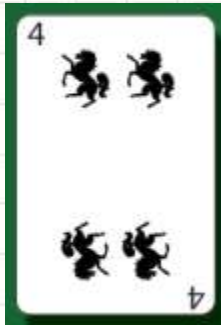


Inicial: 0

Menor: 2

PosMenor: 3

Ordenação por Seleção - Exemplo

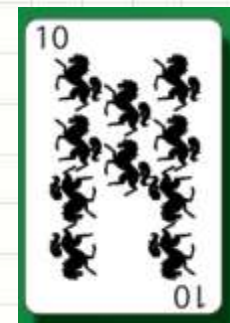
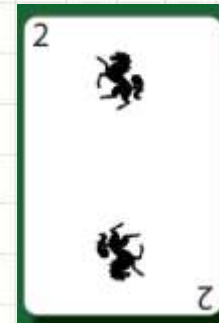
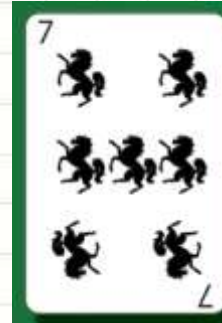
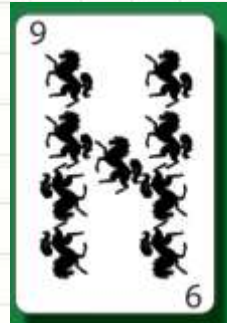
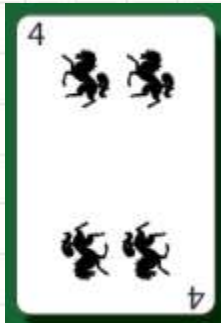


Inicial: 0

Menor: 2

PosMenor: 3

Ordenação por Seleção - Exemplo

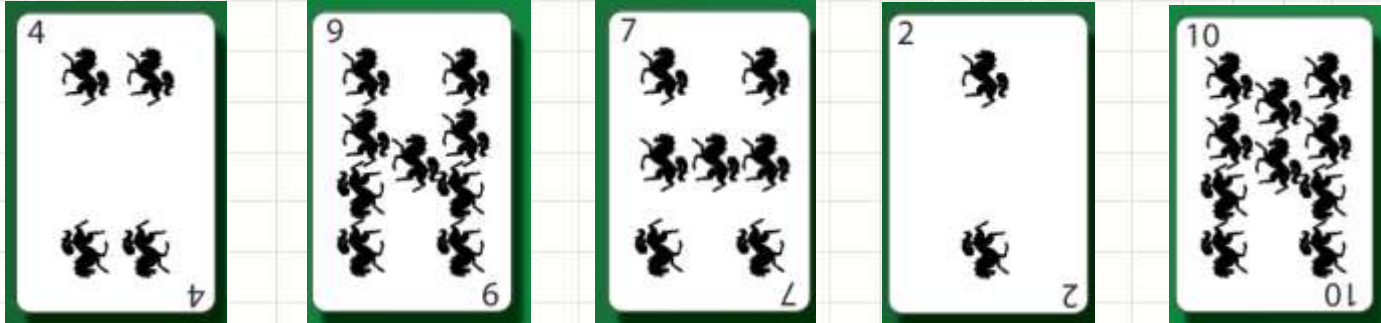


Inicial: 0

Menor: 2

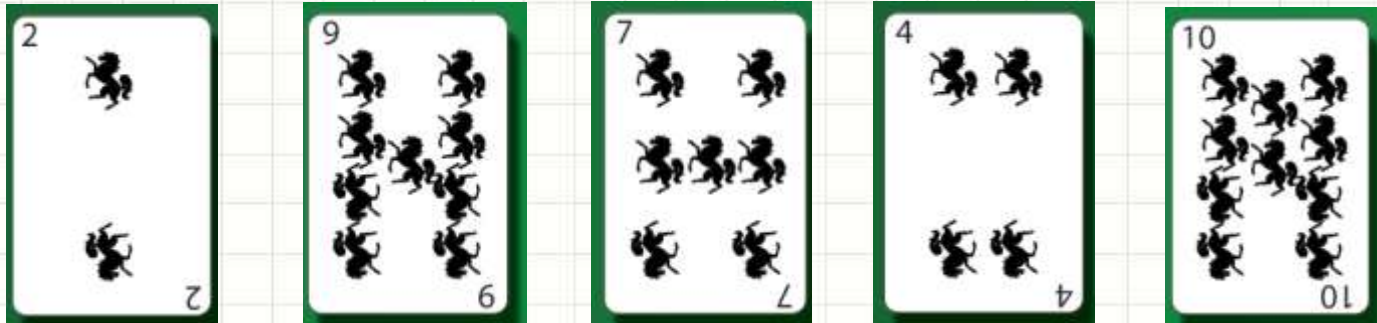
PosMenor: 3

Ordenação por Seleção - Exemplo

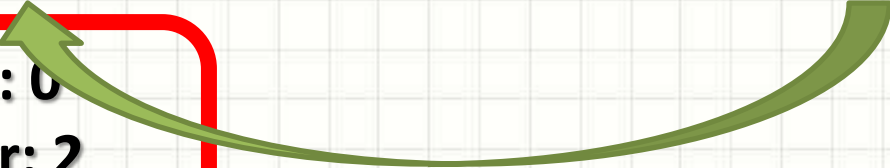


Inicial: 0
Menor: 2
PosMenor: 3

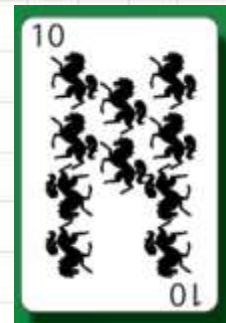
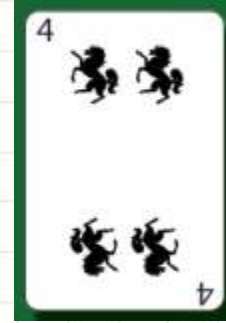
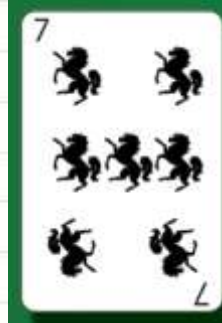
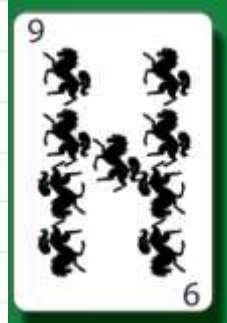
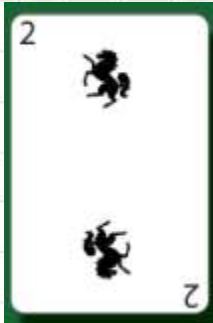
Ordenação por Seleção - Exemplo



Inicial: 0
Menor: 2
PosMenor: 3



Ordenação por Seleção - Exemplo

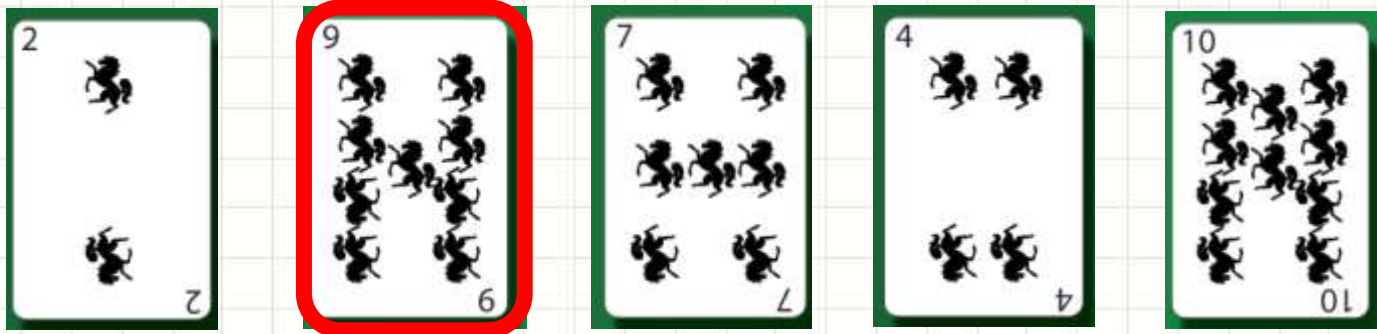


Inicial: **1**

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

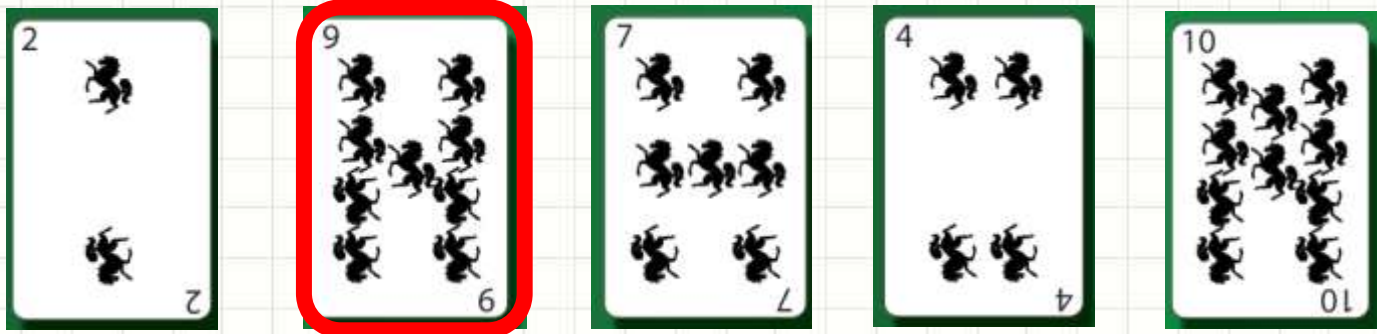


Inicial: 1

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

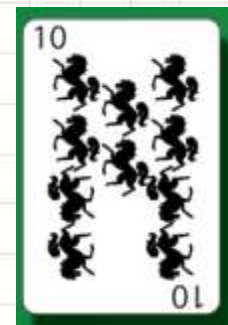
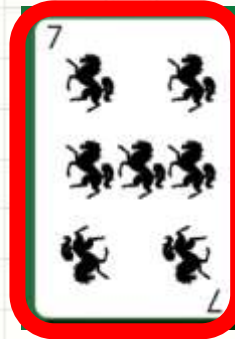
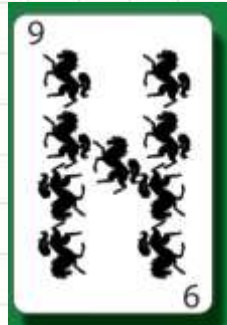
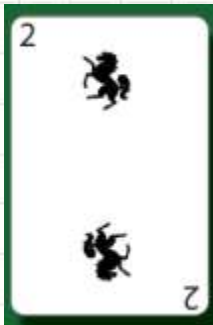


Inicial: 1

Menor: 9

PosMenor: 1

Ordenação por Seleção - Exemplo

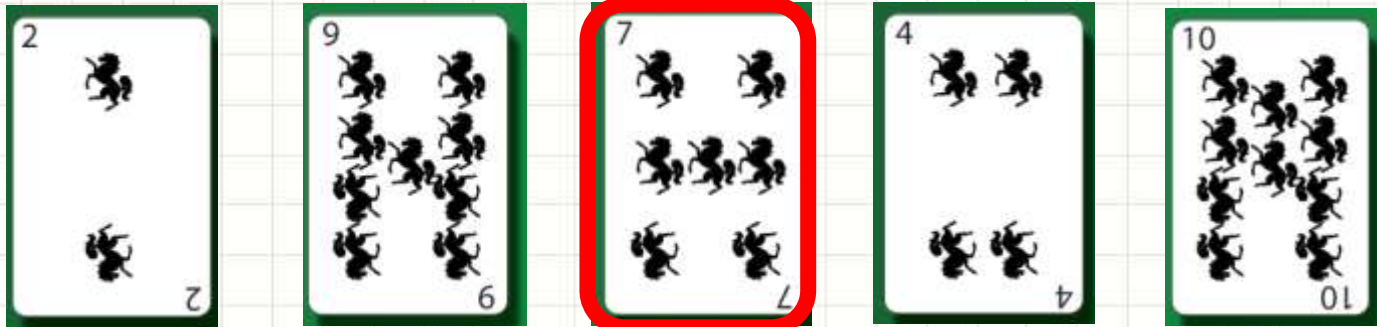


Inicial: 1

Menor: 9

PosMenor: 1

Ordenação por Seleção - Exemplo

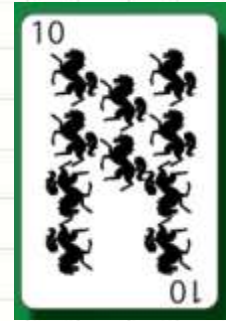
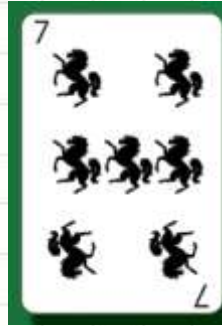
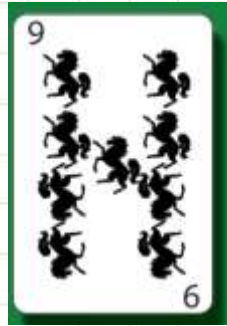
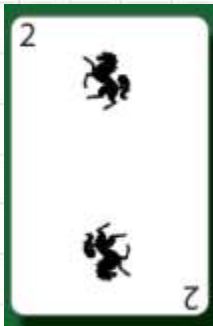


Inicial: 1

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

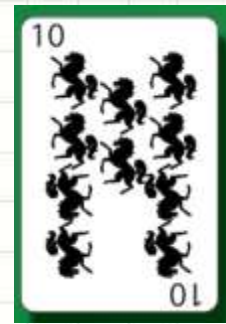
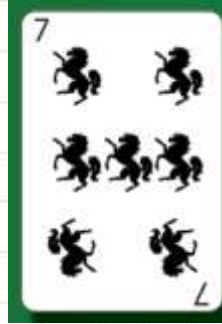
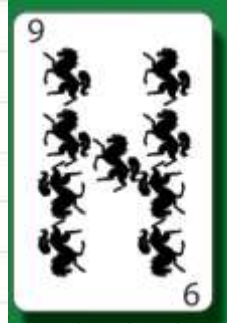
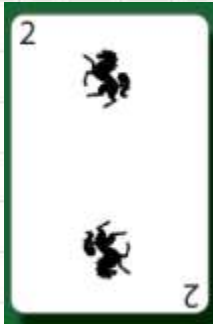


Inicial: 1

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

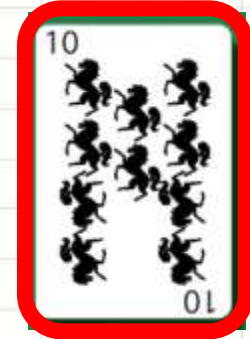
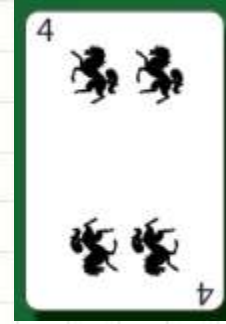
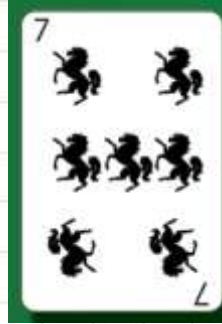
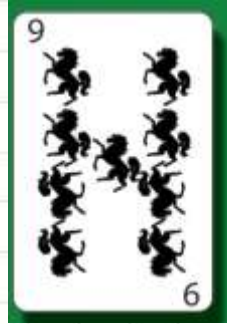
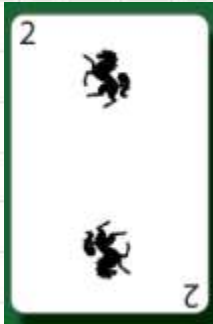


Inicial: 1

Menor: 4

PosMenor: 3

Ordenação por Seleção - Exemplo

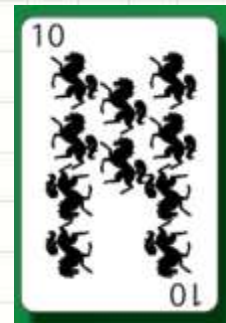
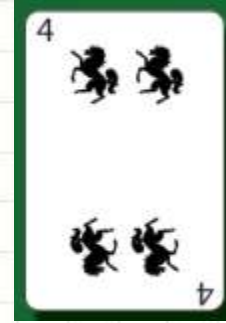
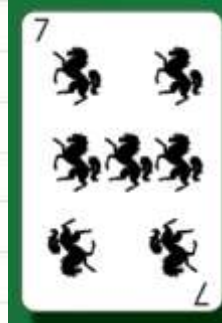
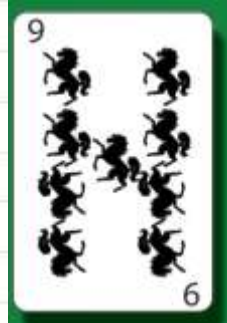
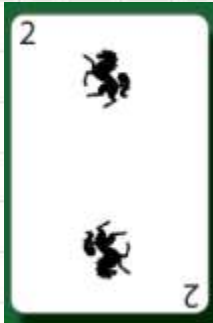


Inicial: 1

Menor: 4

PosMenor: 3

Ordenação por Seleção - Exemplo

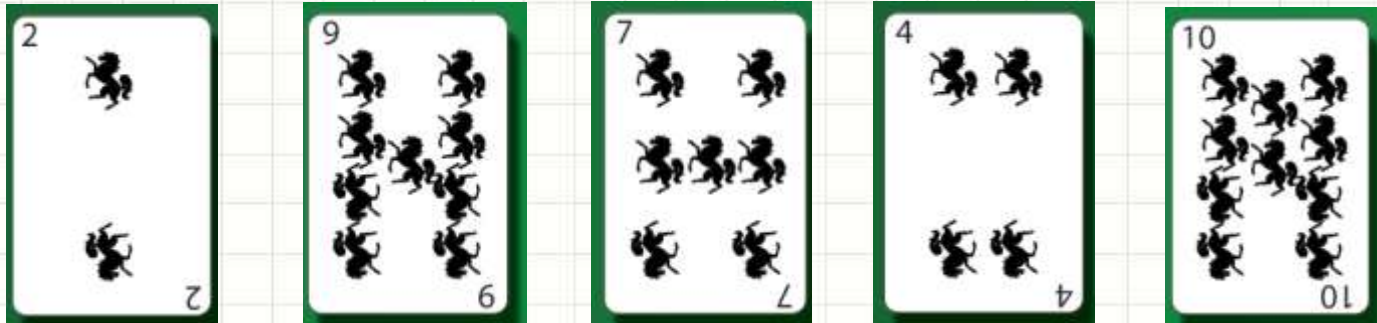


Inicial: 1

Menor: 4

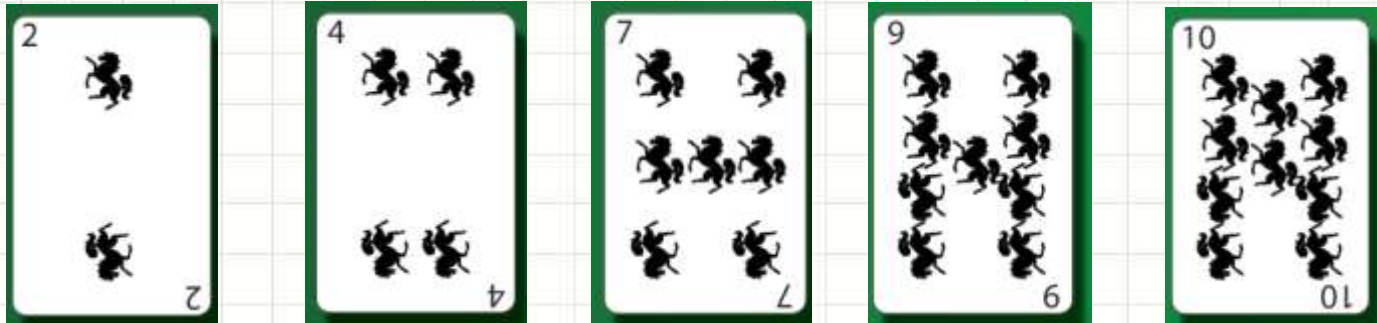
PosMenor: 3

Ordenação por Seleção - Exemplo



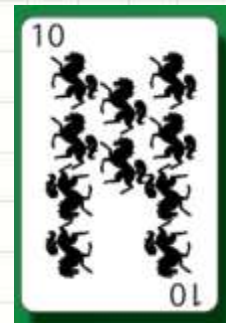
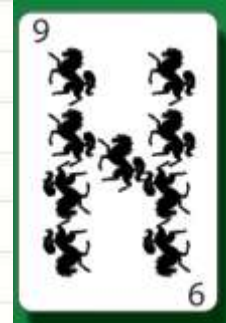
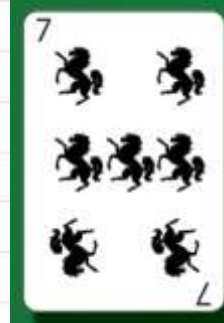
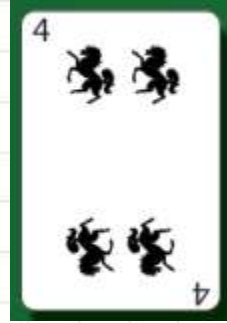
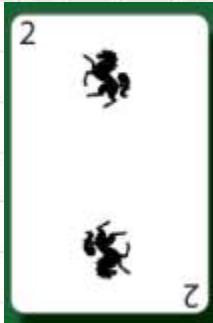
Inicial: 1
Menor: 4
PosMenor: 3

Ordenação por Seleção - Exemplo



Inicial: 1
Menor: 4
PosMenor: 3

Ordenação por Seleção - Exemplo

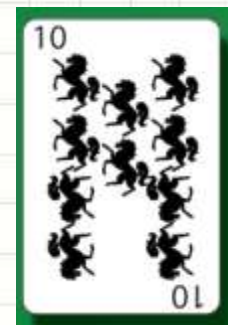
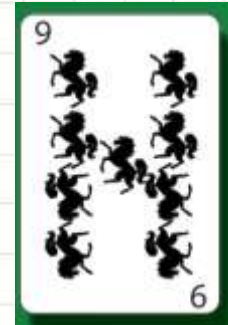
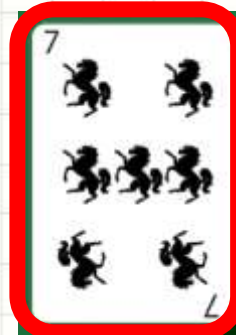
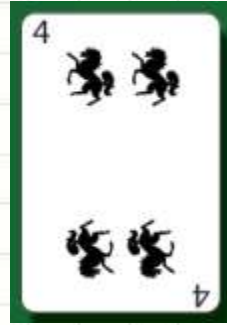
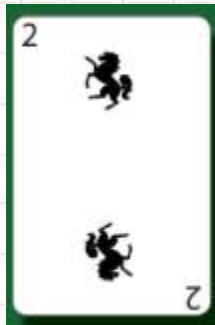


Inicial: **2**

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

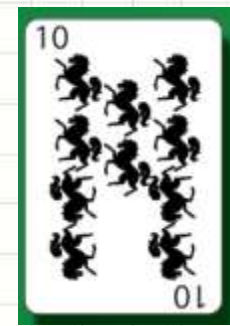
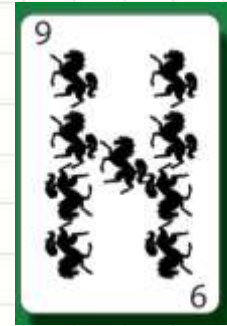
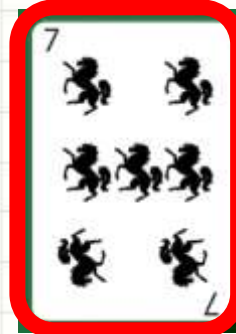
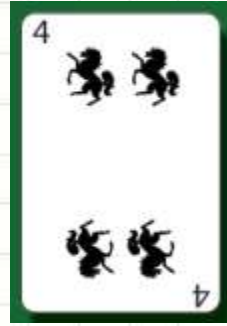
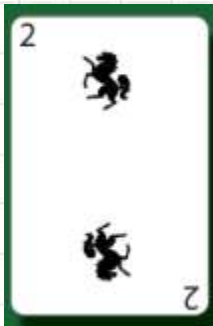


Inicial: 2

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

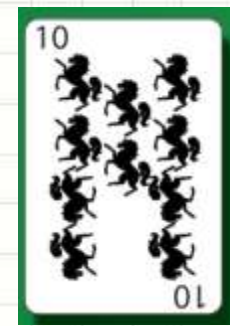
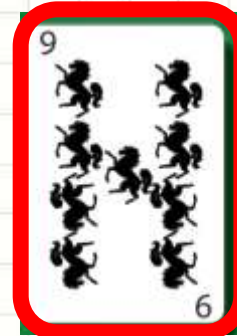
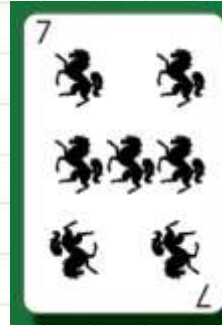
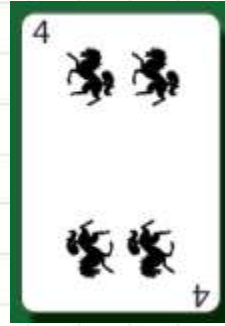
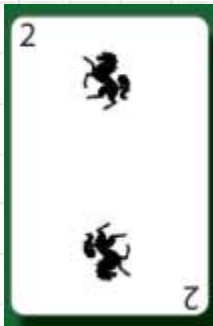


Inicial: 2

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

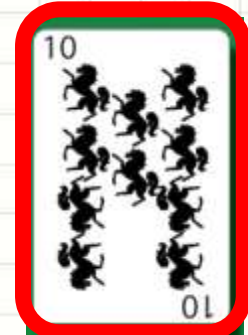
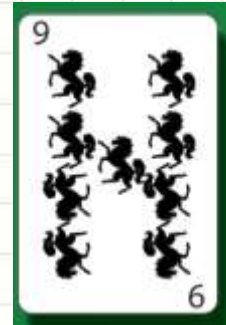
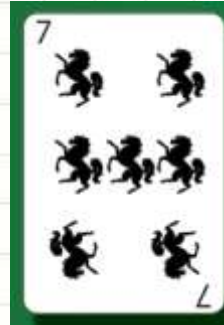
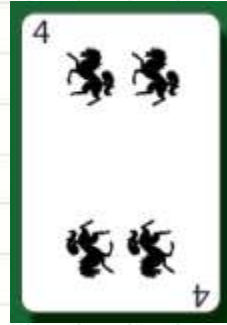
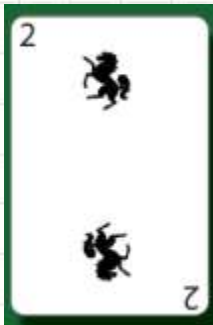


Inicial: 2

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

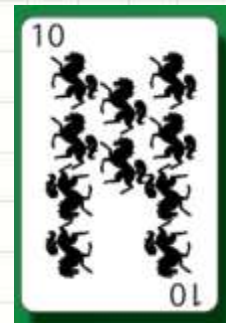
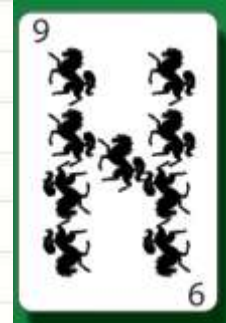
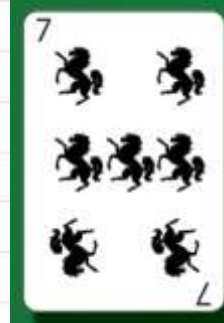
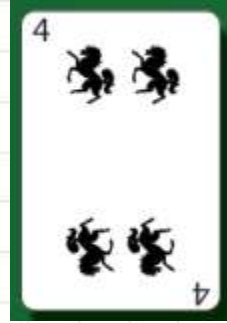
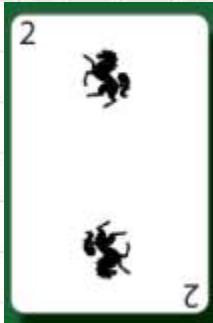


Inicial: 2

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

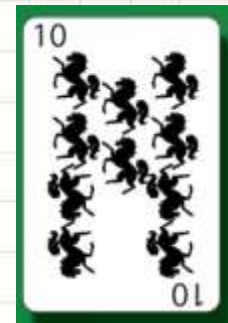
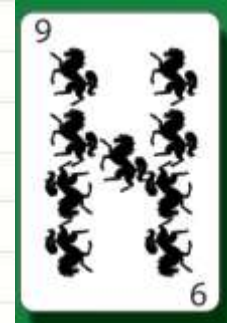
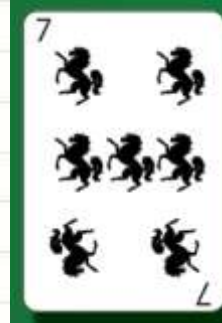
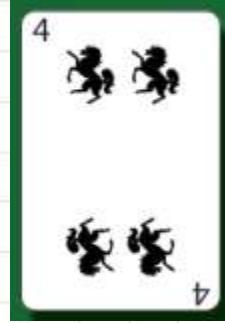
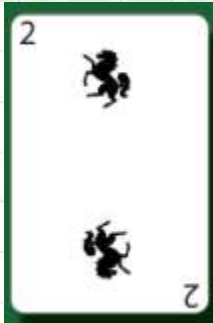


Inicial: 2

Menor: 7

PosMenor: 2

Ordenação por Seleção - Exemplo

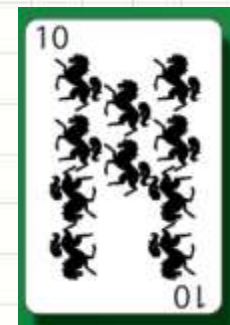
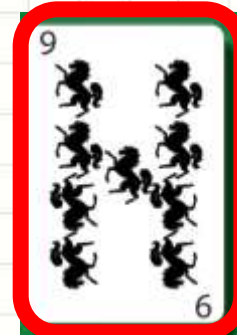
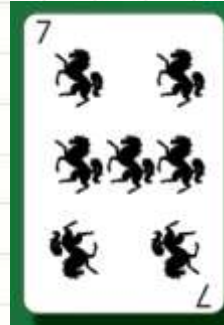
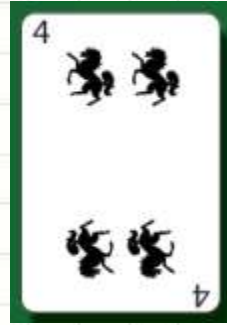
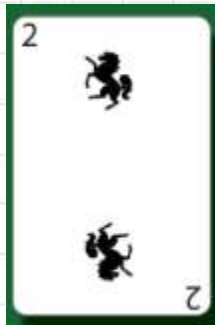


Inicial: **3**

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

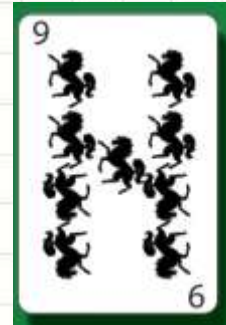
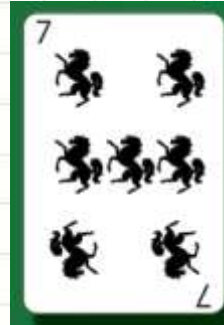
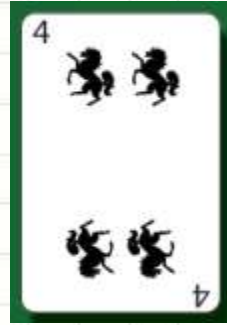
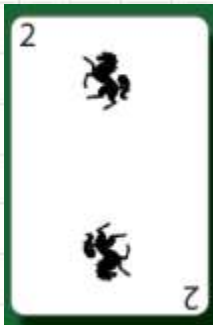


Inicial: 3

Menor: 9

PosMenor: 3

Ordenação por Seleção - Exemplo

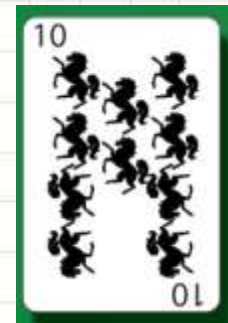
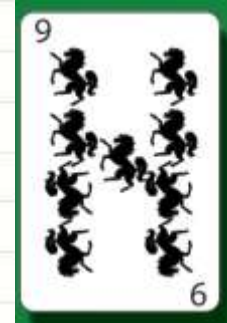
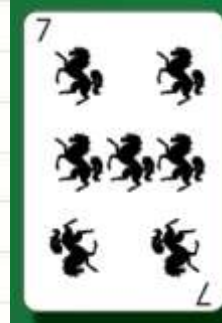
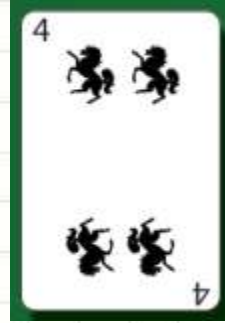
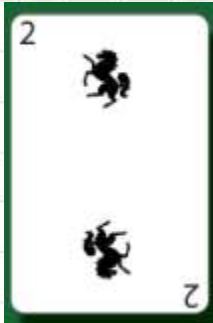


Inicial: 3

Menor: 9

PosMenor: 3

Ordenação por Seleção - Exemplo

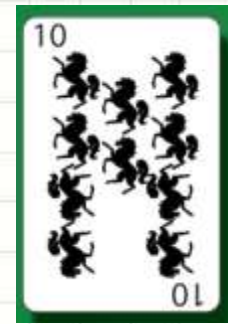
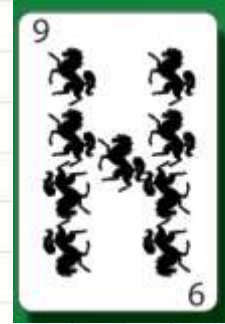
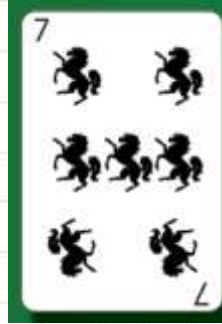
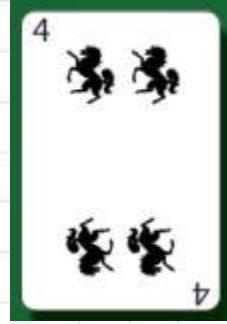
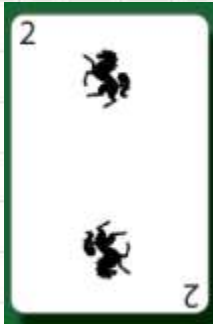


Inicial: 3

Menor: 9

PosMenor: 3

Ordenação por Seleção - Exemplo

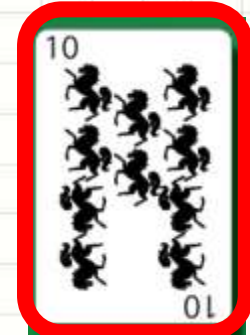
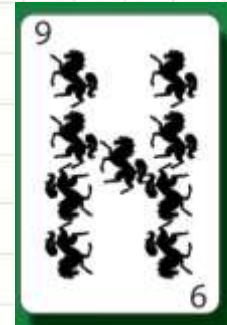
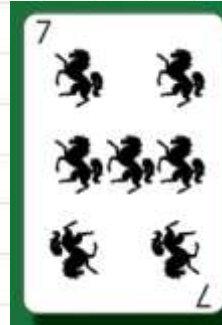
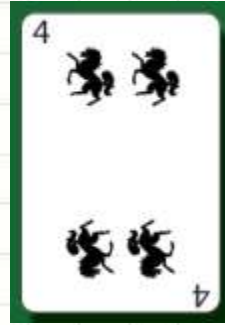
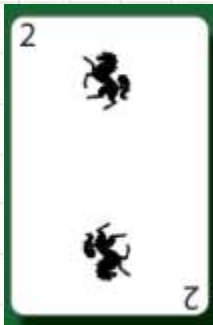


Inicial: **4**

Menor: ?

PosMenor: ?

Ordenação por Seleção - Exemplo

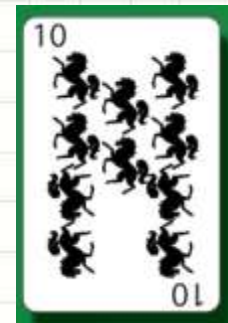
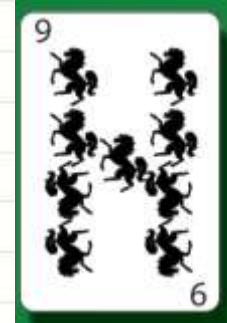
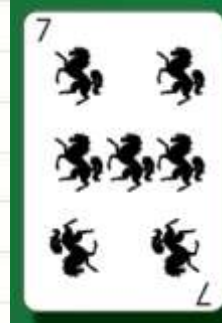
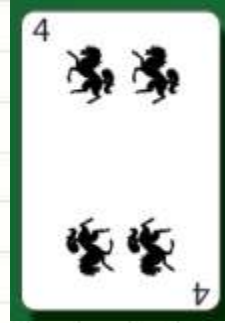
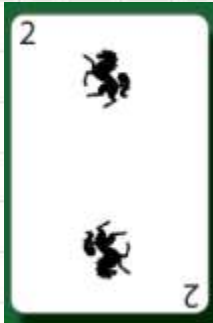


Inicial: 4

Menor: 10

PosMenor: 4

Ordenação por Seleção - Exemplo



Inicial: 4
Menor: 10
PosMenor: 4

FIM!

**É mais rápido e gasta
menos memória!**

Ordenação por Seleção

- Implementando...
 - Lista com n elementos
- Algoritmo
 1. $i=0$
 2. Busca menor a partir de i ; anotar a pos. **menor**
 3. Trocar elemento da pos. i com o da pos. **menor**
 4. $i = i + 1$
 5. Volta para o passo 2 se $i < n$
- Pegue o código base da aula – **selecao.cpp**

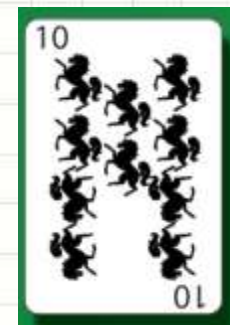
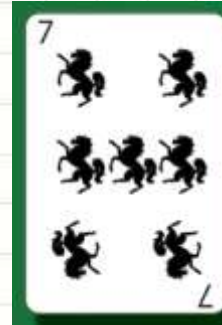
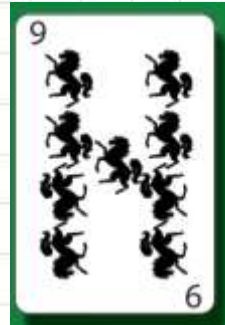
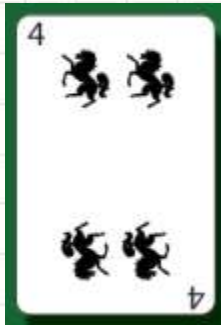


ORDENANDO UMA LISTA POR INSERÇÃO

Ordenação por Seleção

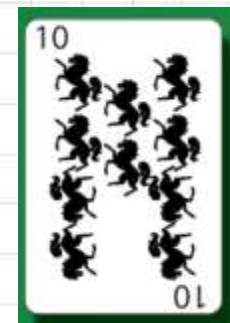
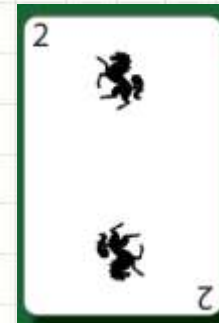
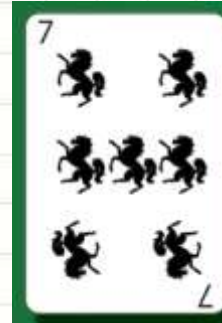
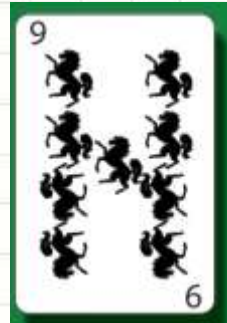
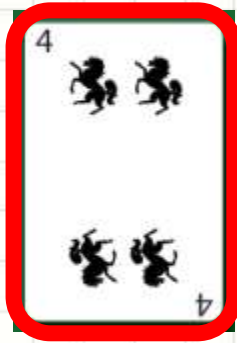
- Lista 1: Lista Desordenada
- Lista 2: Vazia: Construir lista ordenada
- Procedimento
 - Pegar 1º elemento da Lista 1
 - Inserir-lo em sua correta posição na Lista 2
 - Pegar 2º elemento da Lista 1
 - Inserir-lo em sua correta posição na Lista 2
 - ...

Ordenação por Inserção - Exemplo



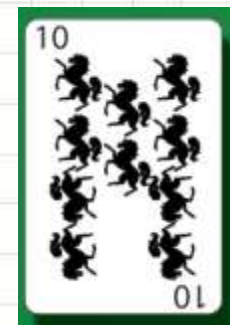
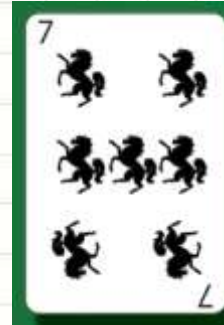
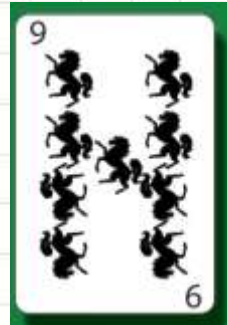
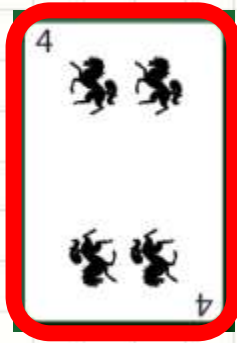
Atual: ?

Ordenação por Inserção - Exemplo



Atual: 0

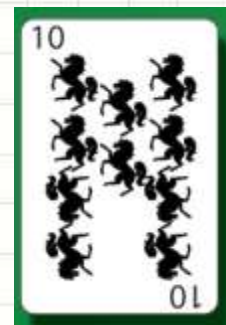
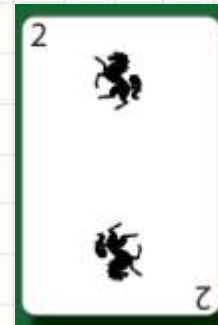
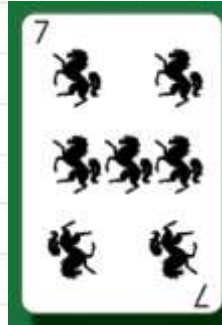
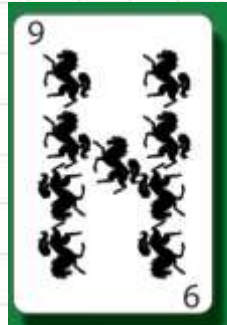
Ordenação por Inserção - Exemplo



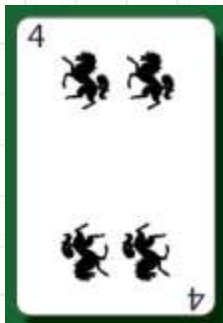
Atual



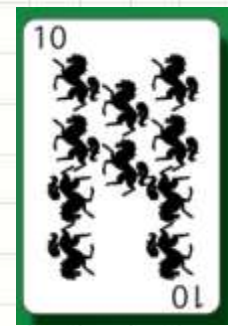
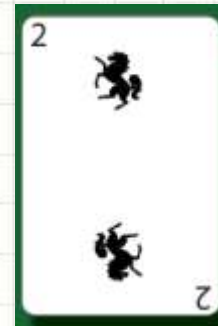
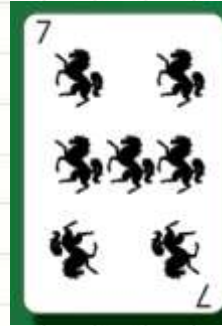
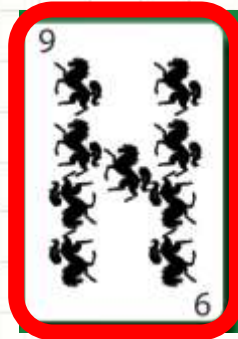
Ordenação por Inserção - Exemplo



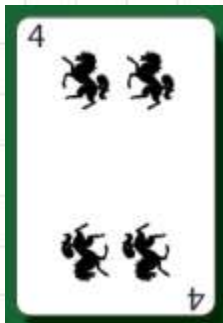
Atual



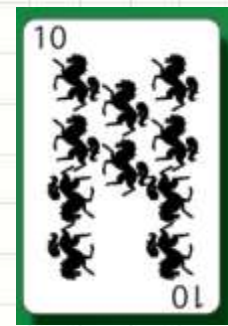
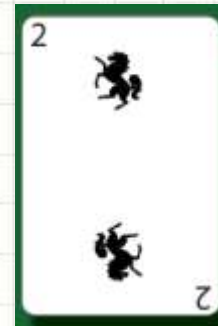
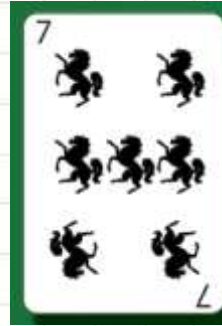
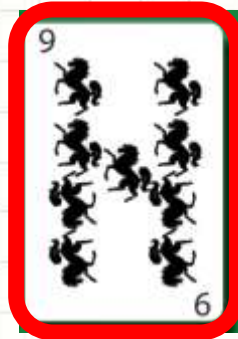
Ordenação por Inserção - Exemplo



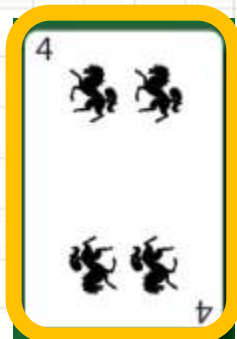
Atual: 1



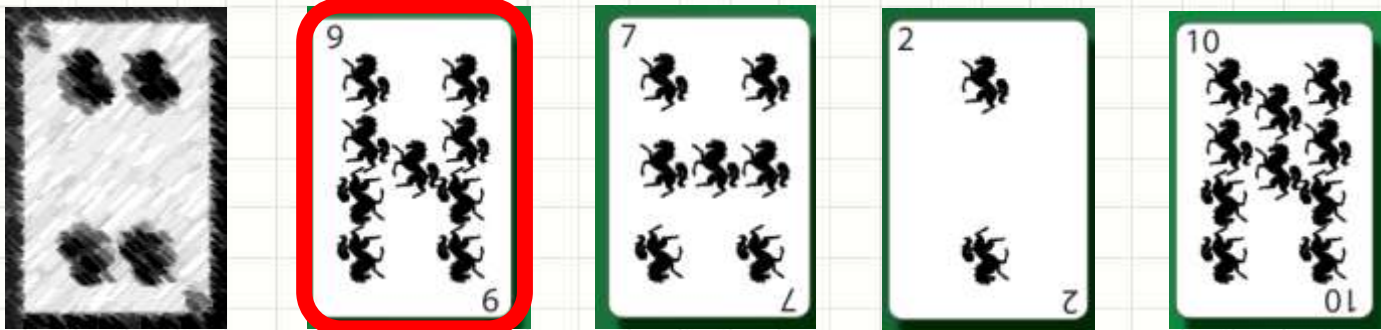
Ordenação por Inserção - Exemplo



Atual: 1

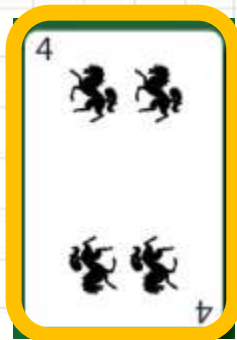


Ordenação por Inserção - Exemplo

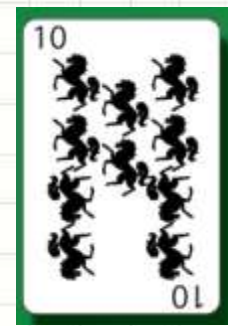
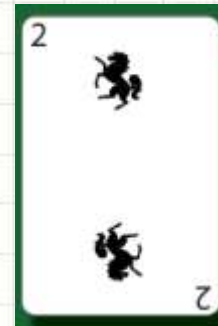
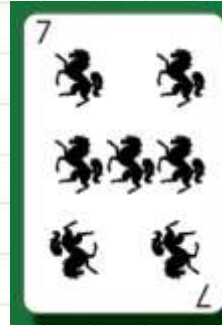
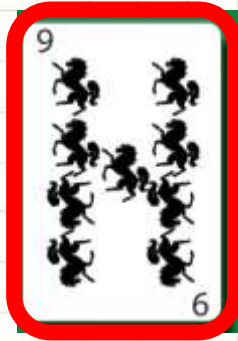


Atual: 1

4 < 9?



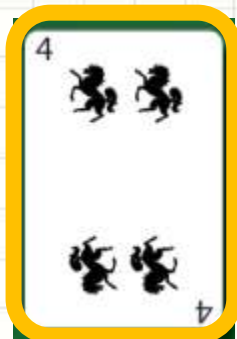
Ordenação por Inserção - Exemplo



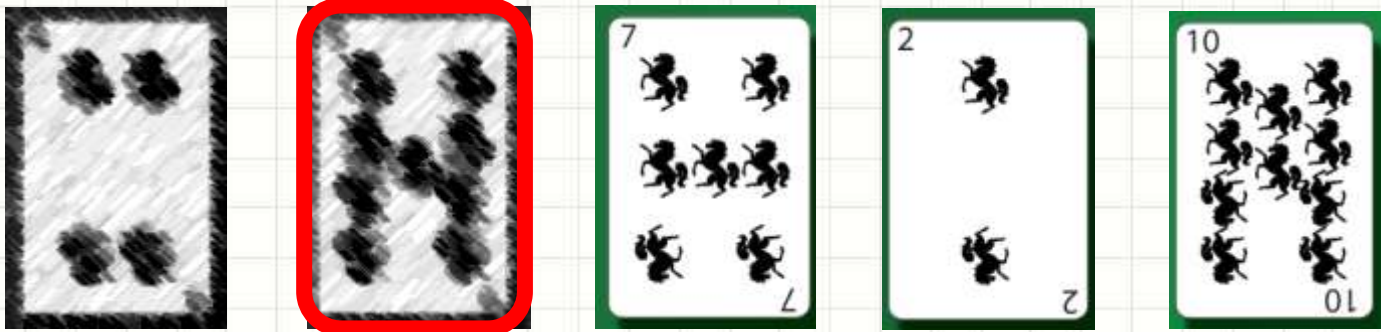
Atual: 1



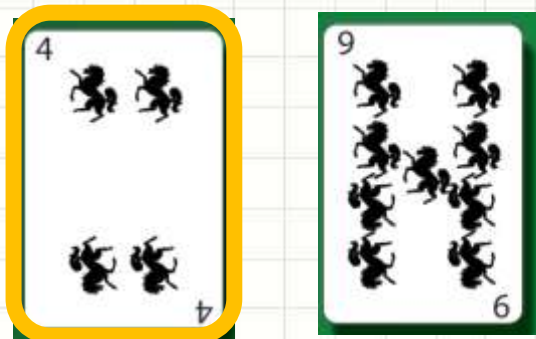
SIM!



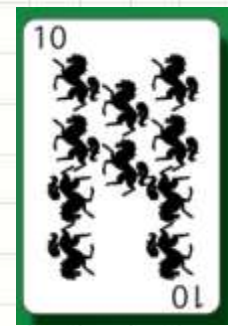
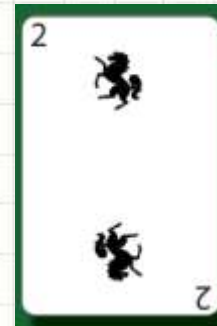
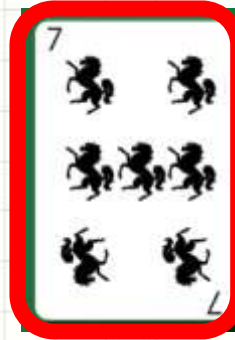
Ordenação por Inserção - Exemplo



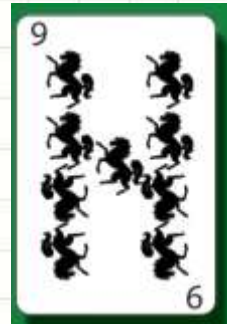
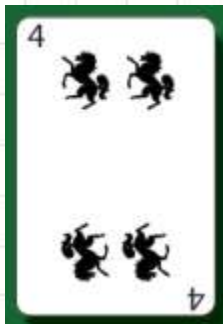
Atual: 1



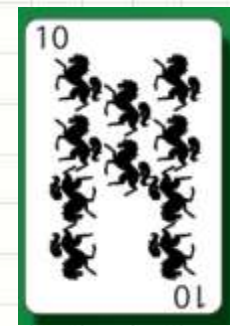
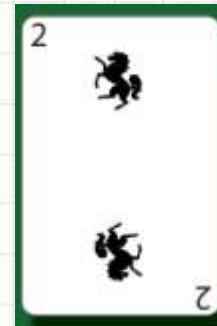
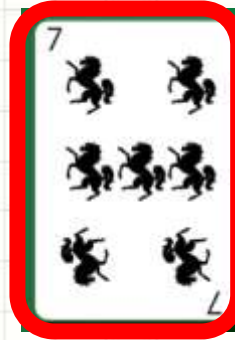
Ordenação por Inserção - Exemplo



Atual: 2

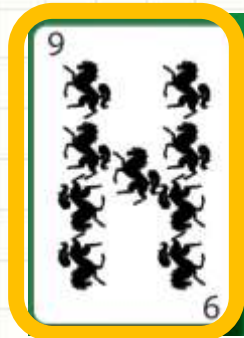
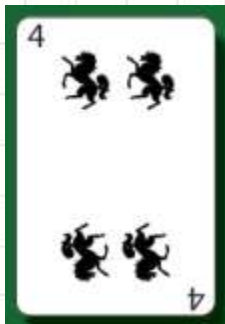


Ordenação por Inserção - Exemplo

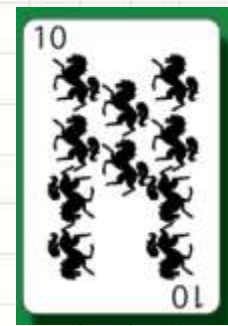
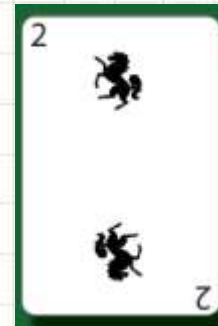
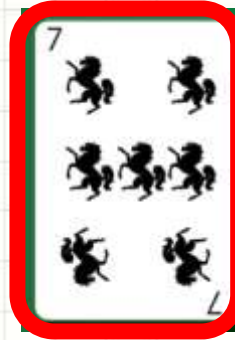


Atual: 2

9 < 7?

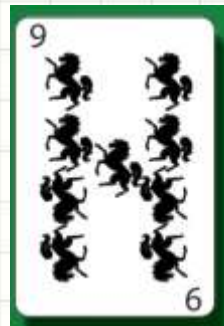
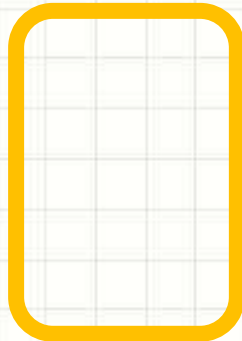
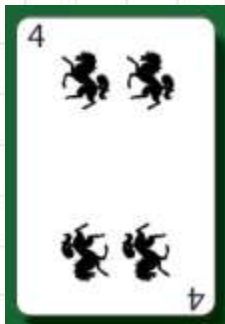


Ordenação por Inserção - Exemplo

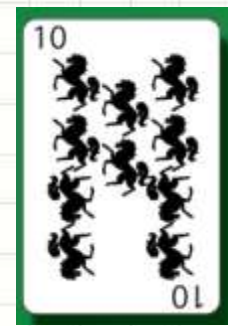
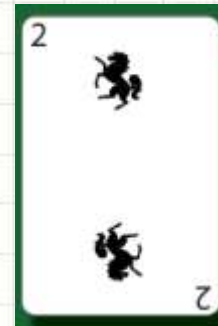
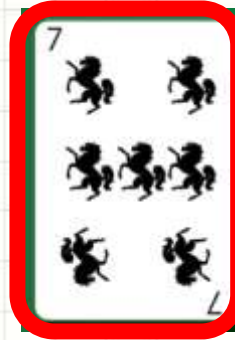


Atual: 2

NÃO

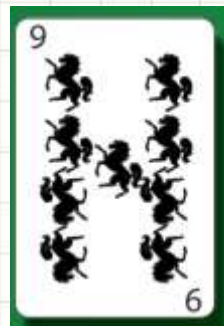
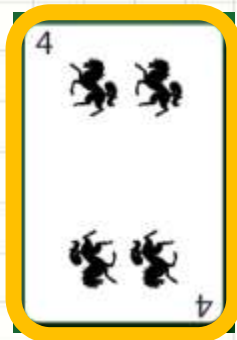


Ordenação por Inserção - Exemplo

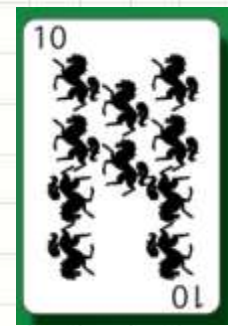
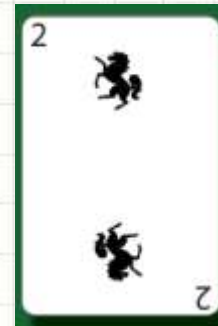
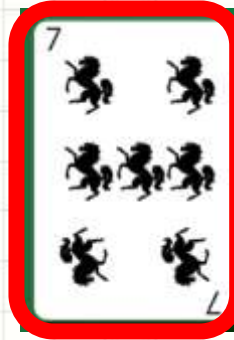


Atual: 2

4 < 7?



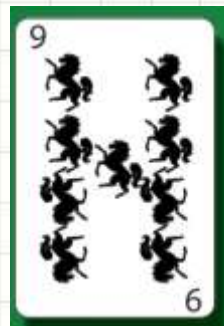
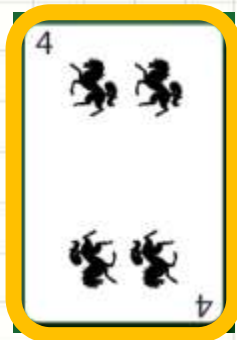
Ordenação por Inserção - Exemplo



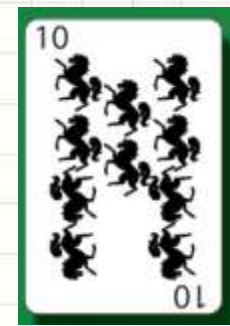
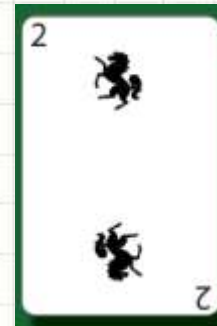
Atual: 2



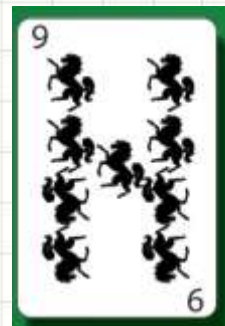
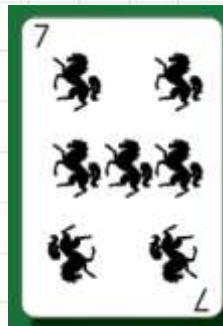
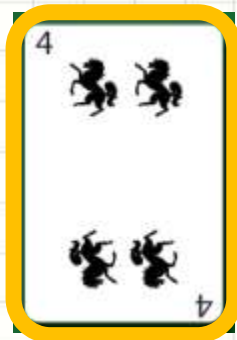
SIM!



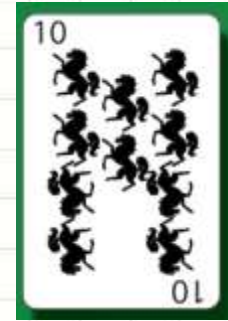
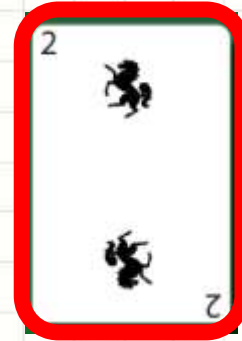
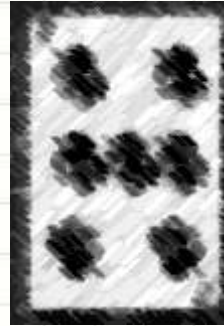
Ordenação por Inserção - Exemplo



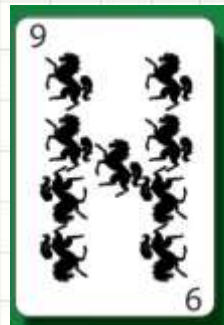
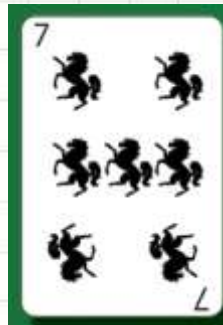
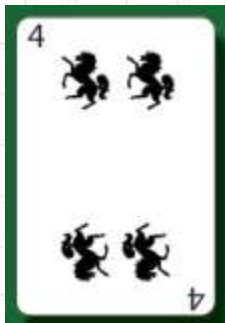
Atual: 2



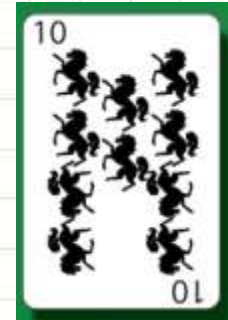
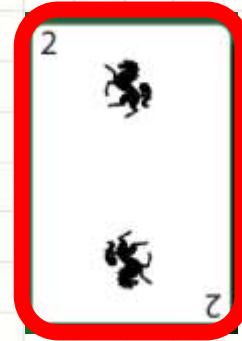
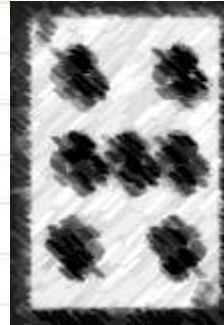
Ordenação por Inserção - Exemplo



Atual: 3

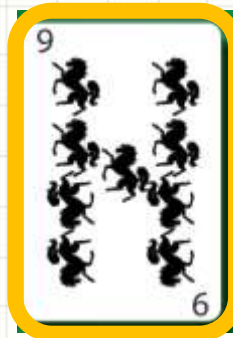
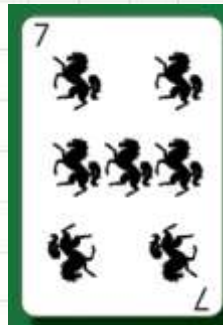
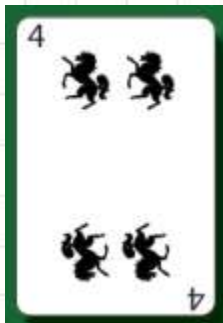


Ordenação por Inserção - Exemplo

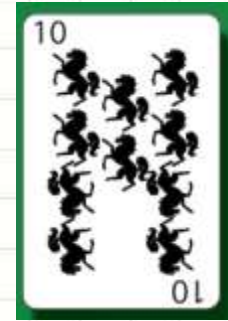
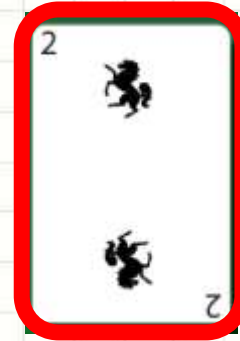
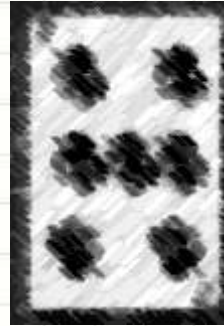


Atual: 3

$9 < 2?$

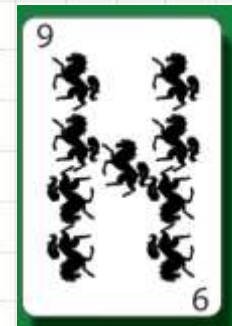
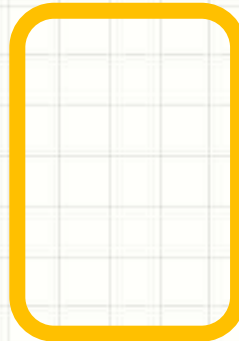
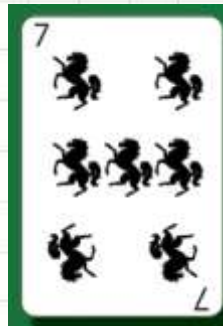
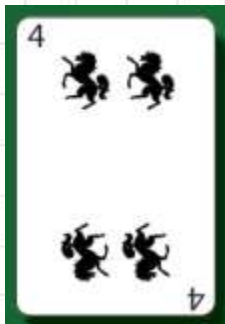


Ordenação por Inserção - Exemplo

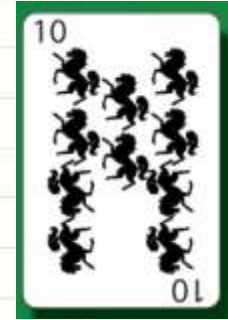
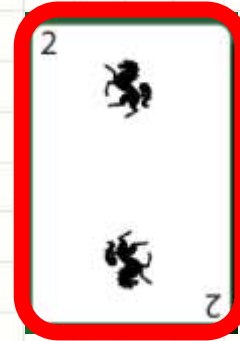
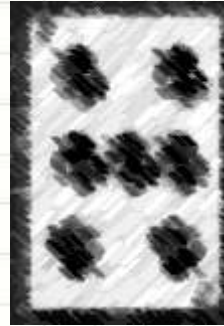


Atual: 3

NÃO!

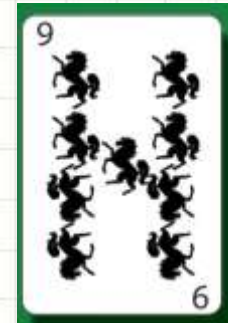
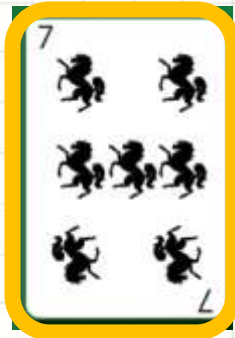
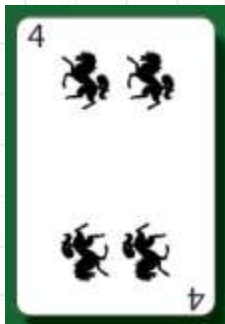


Ordenação por Inserção - Exemplo

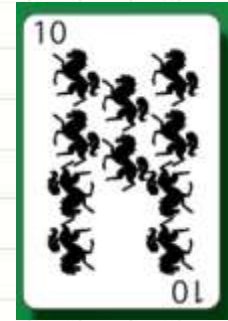
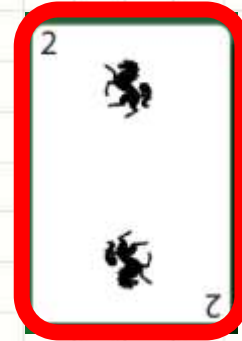
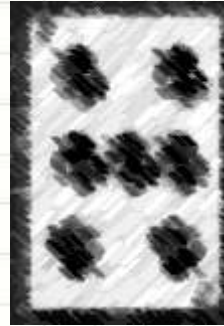


Atual: 3

$7 < 2?$

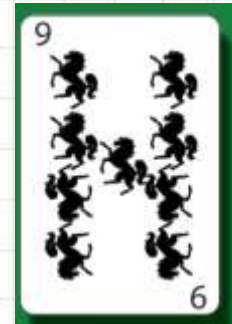
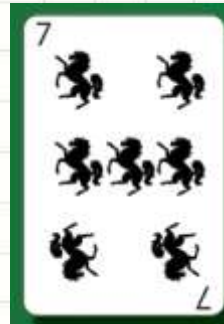
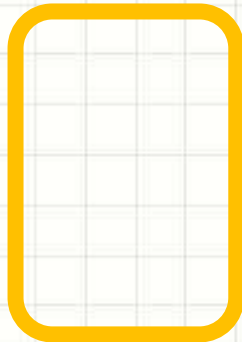
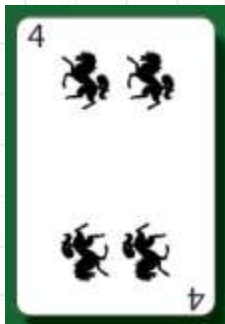


Ordenação por Inserção - Exemplo

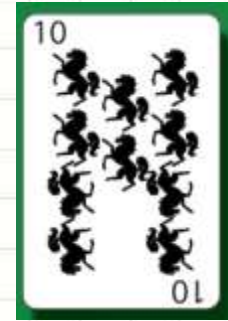
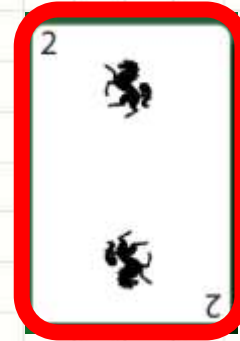
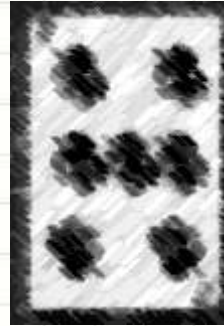


Atual: 3

NÃO!

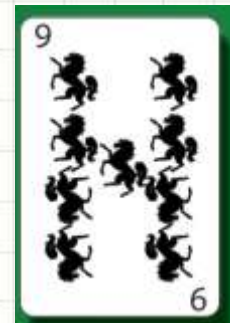
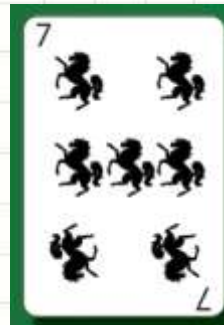
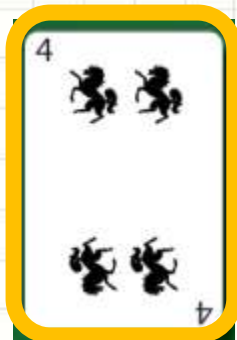


Ordenação por Inserção - Exemplo

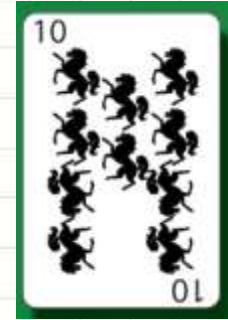
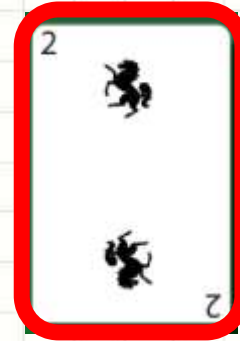
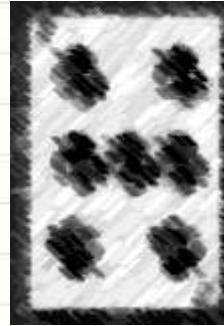


Atual: 3

4 < 2?

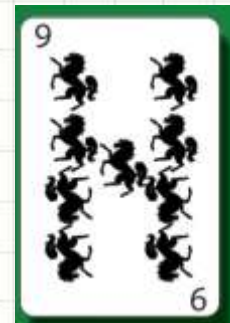
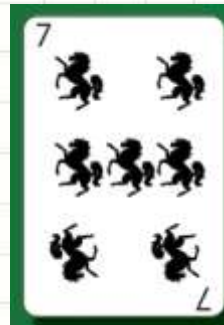
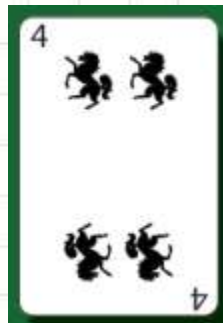
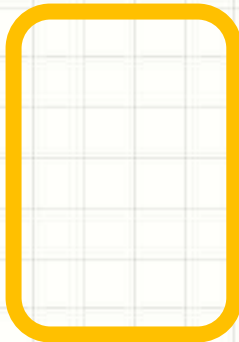


Ordenação por Inserção - Exemplo

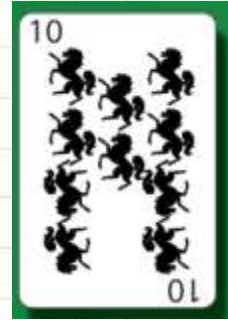
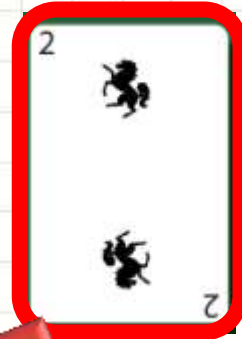
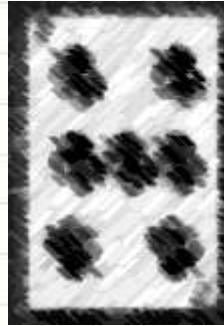


Atual: 3

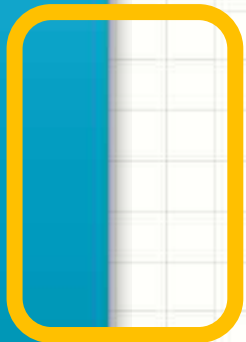
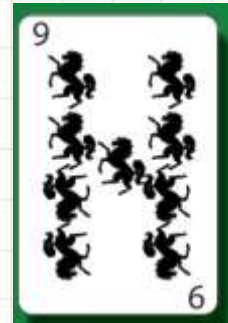
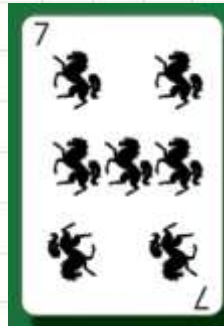
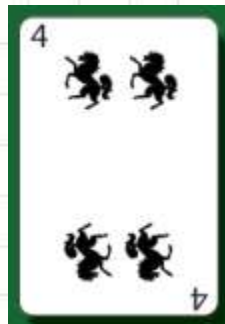
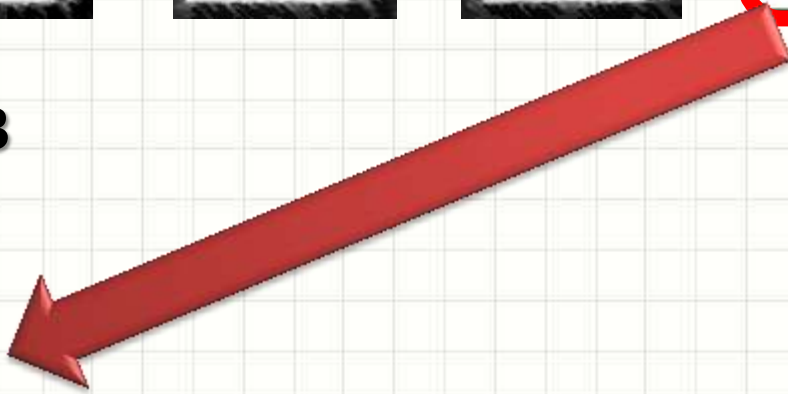
NÃO!



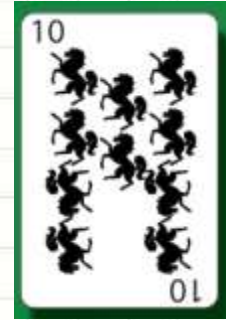
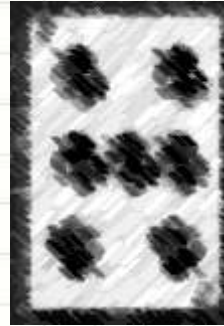
Ordenação por Inserção - Exemplo



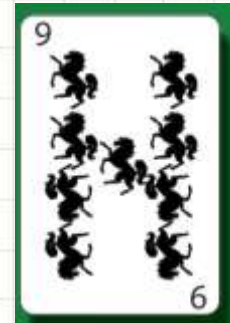
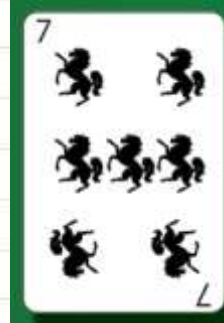
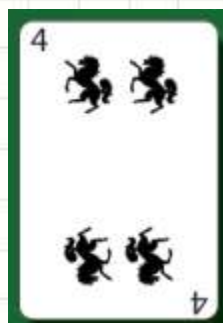
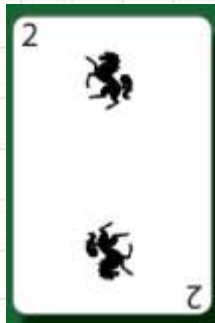
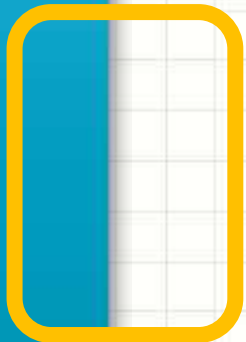
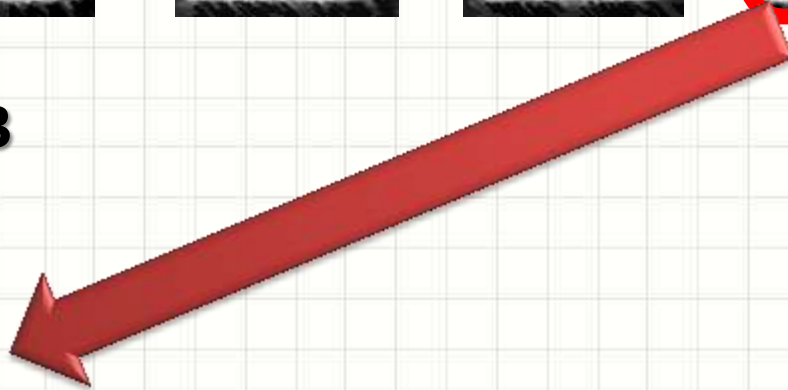
Atual: 3



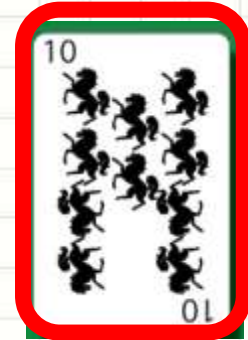
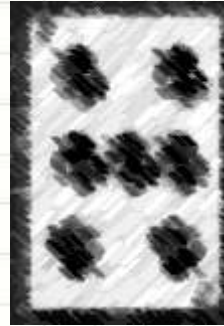
Ordenação por Inserção - Exemplo



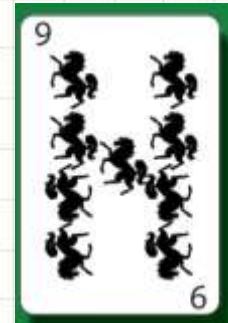
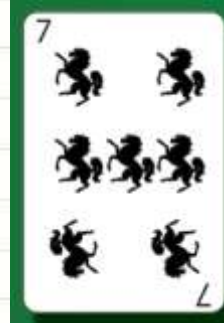
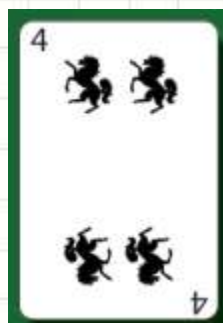
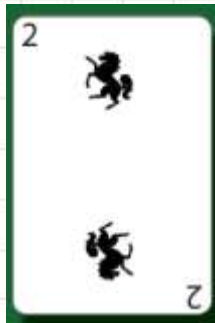
Atual: 3



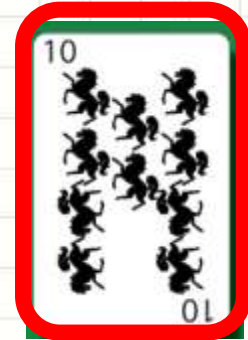
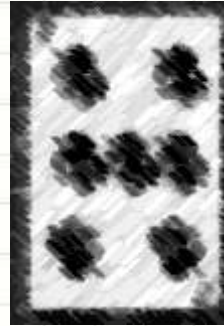
Ordenação por Inserção - Exemplo



Atual: 4

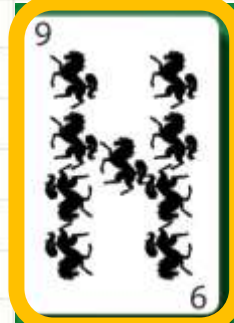
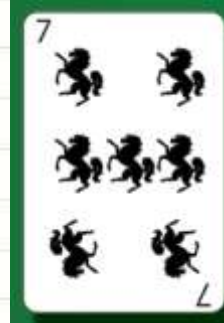
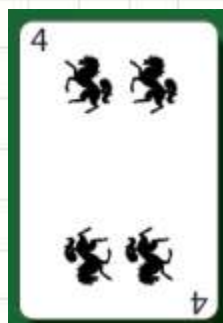
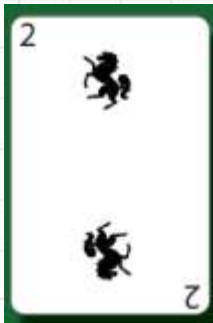


Ordenação por Inserção - Exemplo

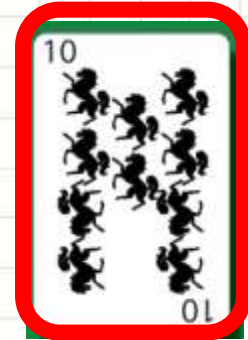
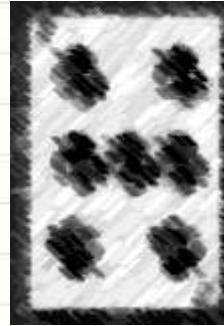


Atual: 4

9 < 10?

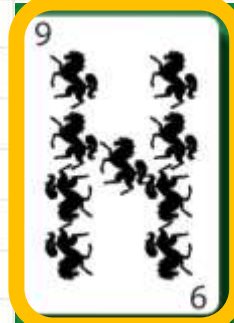
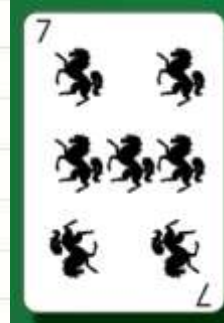
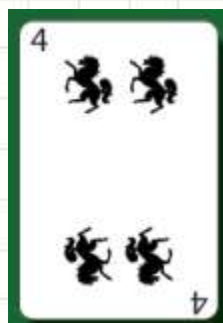
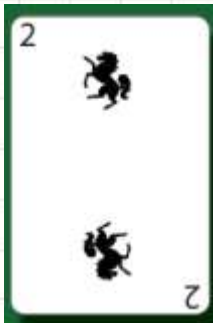


Ordenação por Inserção - Exemplo

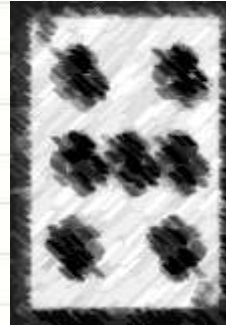


Atual: 4

SIM!

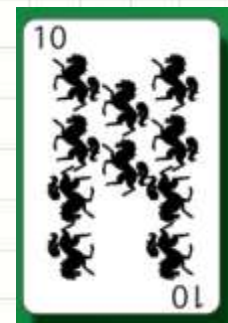
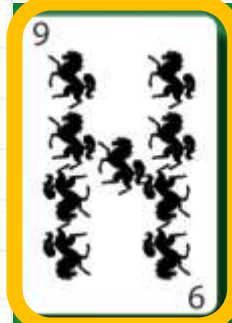
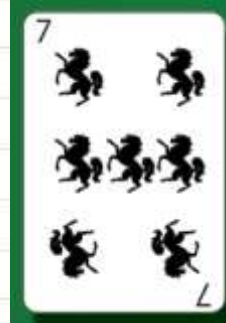
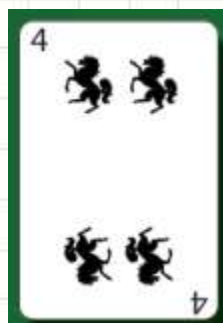
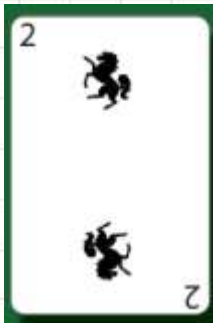


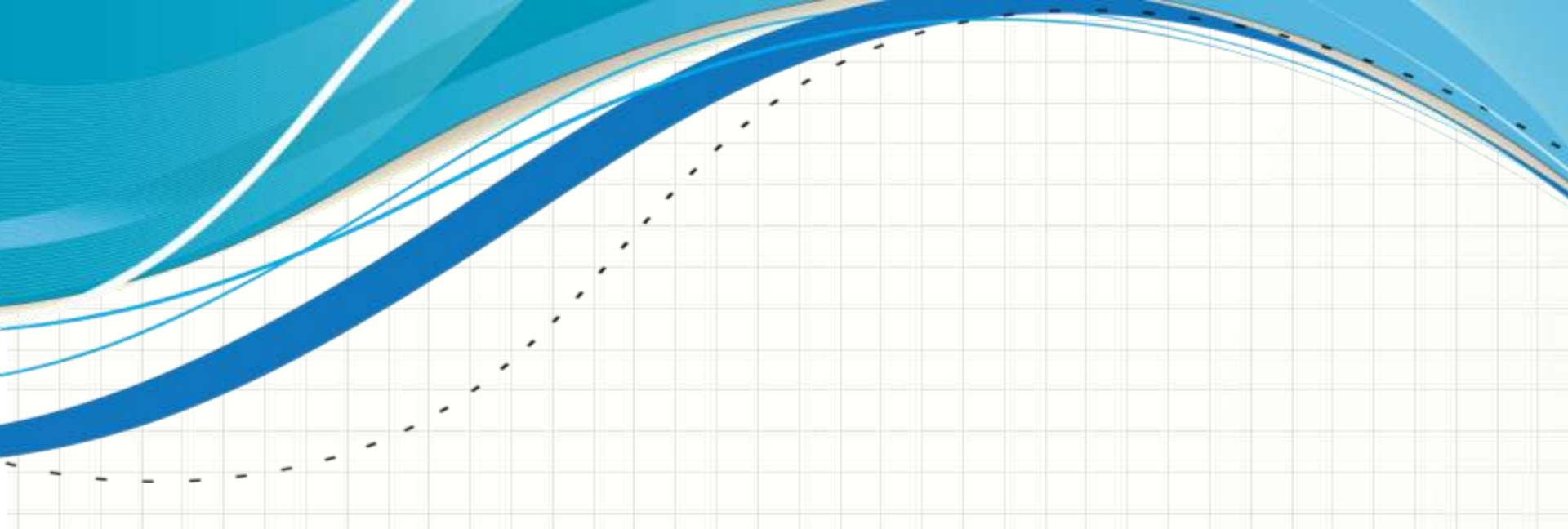
Ordenação por Inserção - Exemplo



Atual: 4

FIM!



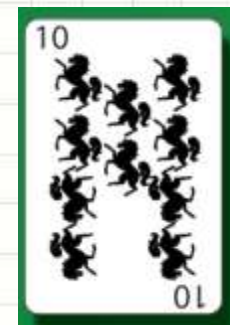
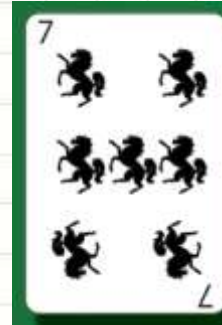
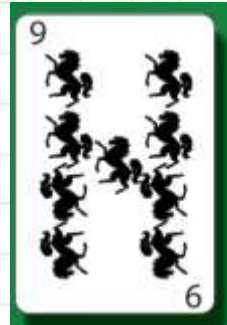
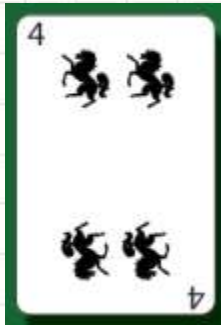


ORDENAÇÃO POR INSERÇÃO OTIMIZADA

Ordenação por Inserção

- Será que precisamos de duas listas?
- Procedimento
 - Pega elemento da pos “1”
 - Trocá-lo um a um com os anteriores até que ele seja maior que seu antecessor imediato
 - Pega elemento da pos “2”
 - Trocá-lo um a um com os anteriores até que ele seja maior que seu antecessor imediato
 - ...

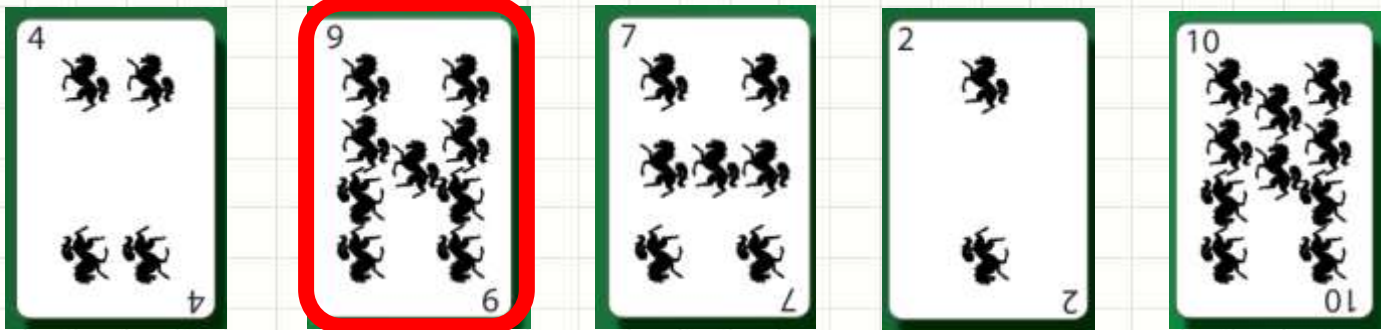
Ordenação por Inserção - Exemplo



Inicial: ?

Atual: ?

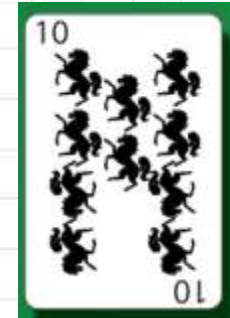
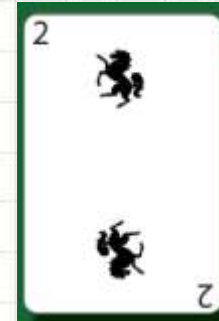
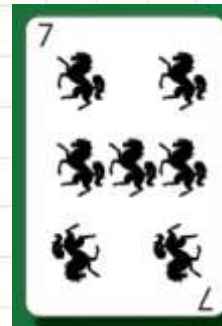
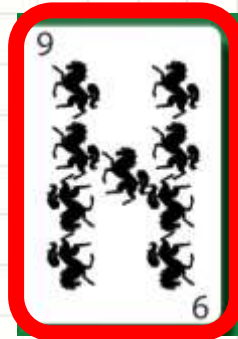
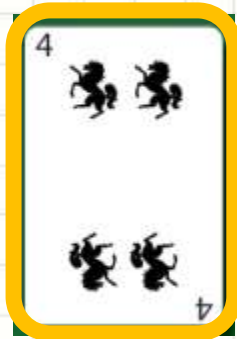
Ordenação por Inserção - Exemplo



Inicial: 1

Atual: ?

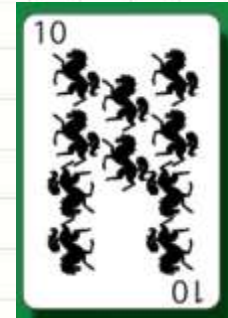
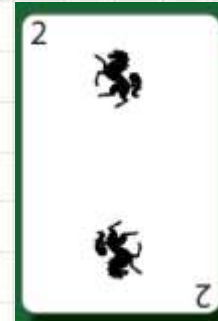
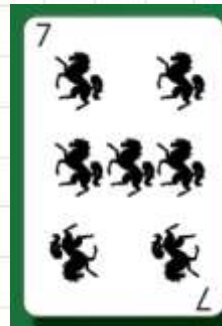
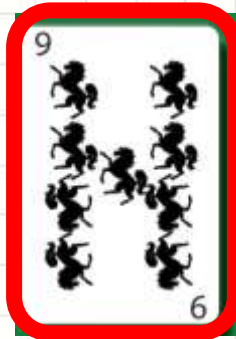
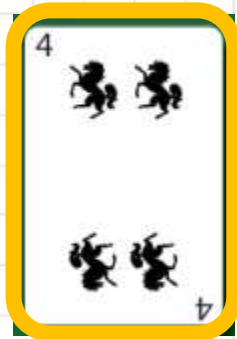
Ordenação por Inserção - Exemplo



Inicial: 1
Atual: 0

$9 < 4?$

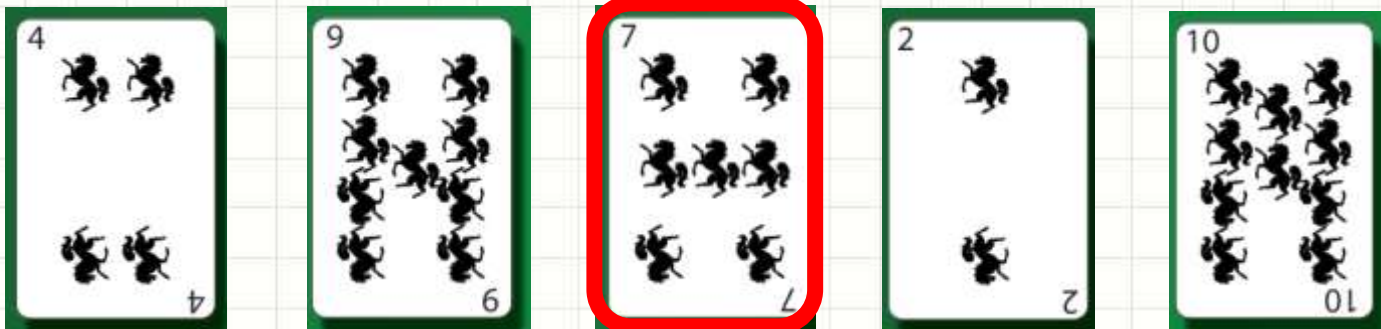
Ordenação por Inserção - Exemplo



Inicial: 1
Atual: 0

NÃO!

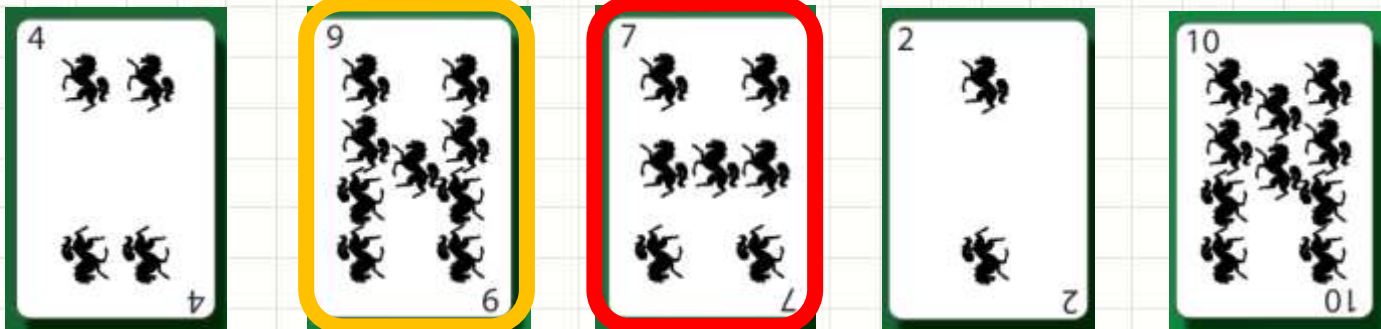
Ordenação por Inserção - Exemplo



Inicial: **2**

Atual: ?

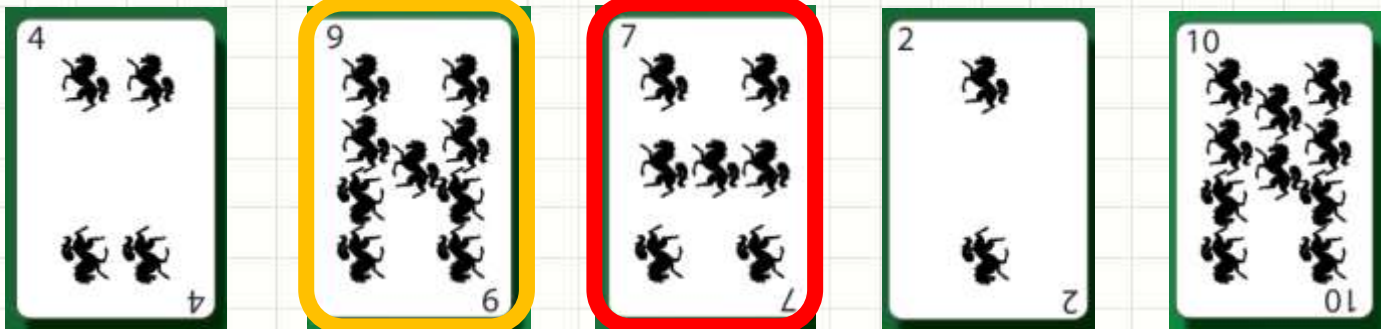
Ordenação por Inserção - Exemplo



Inicial: 2
Atual: 1

$7 < 9?$

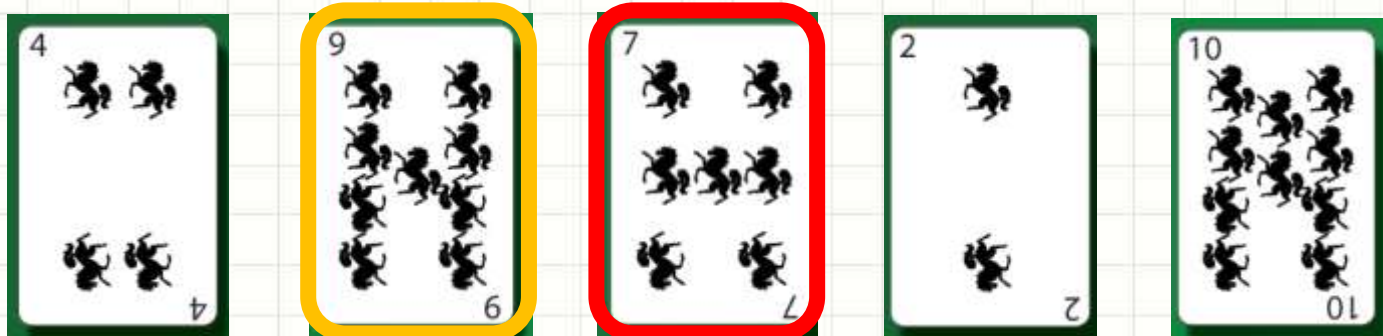
Ordenação por Inserção - Exemplo



Inicial: 2
Atual: 1

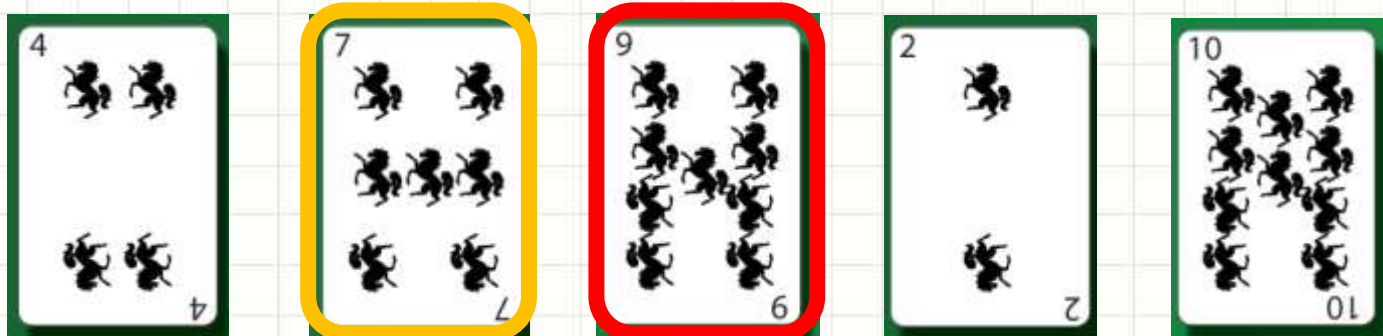
SIM!

Ordenação por Inserção - Exemplo



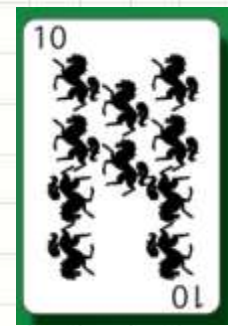
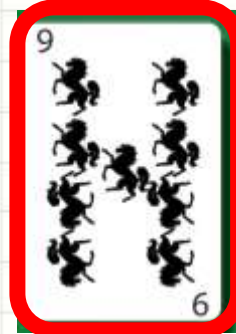
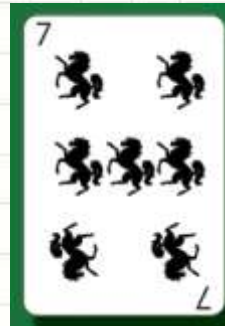
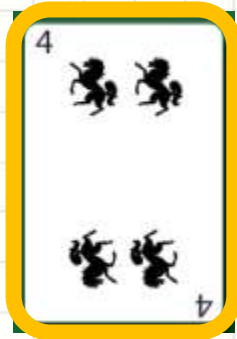
Inicial: 2
Atual: 1

Ordenação por Inserção - Exemplo



Inicial: 2
Atual: 1

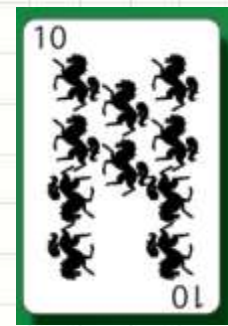
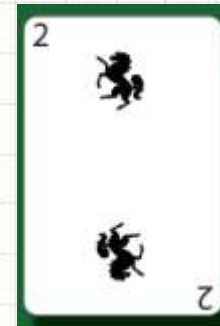
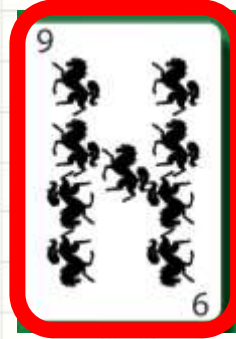
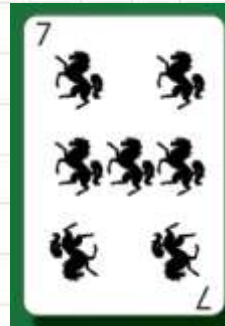
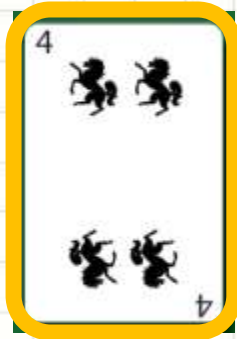
Ordenação por Inserção - Exemplo



Inicial: 2

Atual: 0

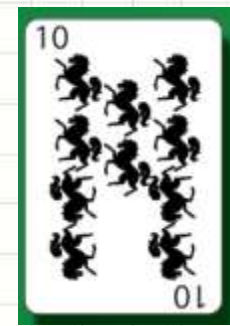
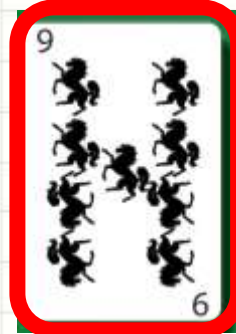
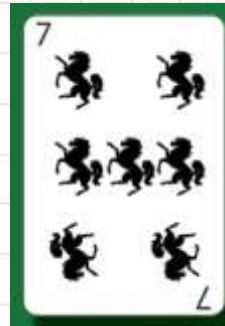
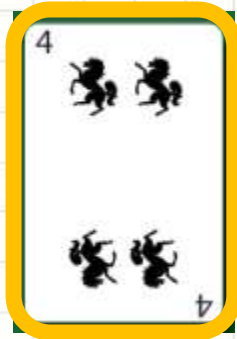
Ordenação por Inserção - Exemplo



Inicial: 2
Atual: 0

$7 < 4?$

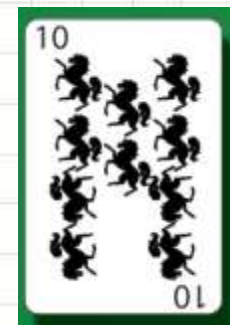
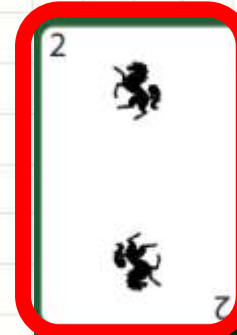
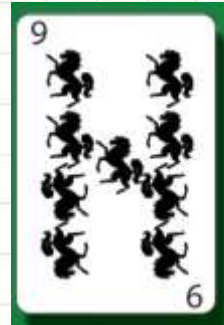
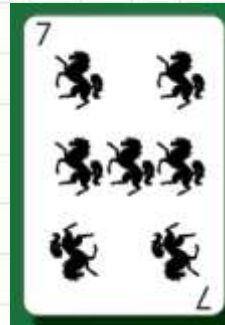
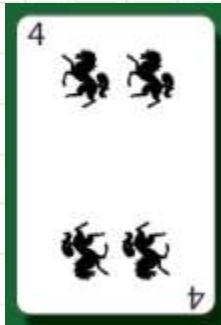
Ordenação por Inserção - Exemplo



Inicial: 2
Atual: 0

NÃO!

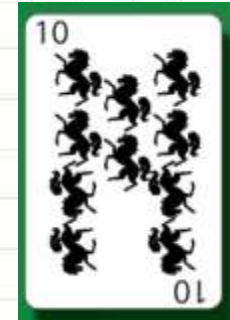
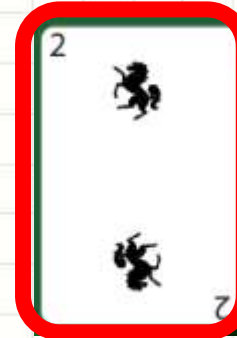
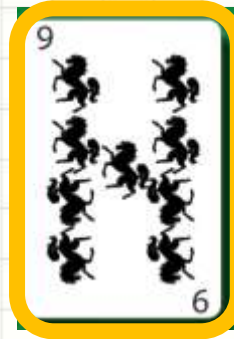
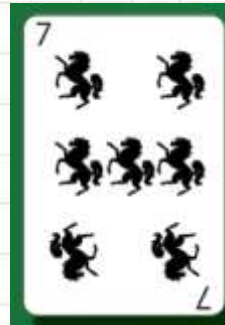
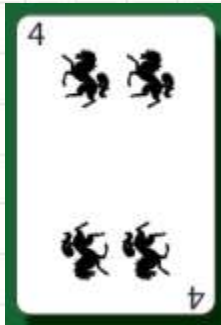
Ordenação por Inserção - Exemplo



Inicial: **3**

Atual: ?

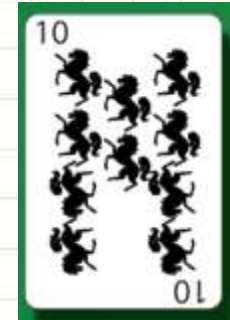
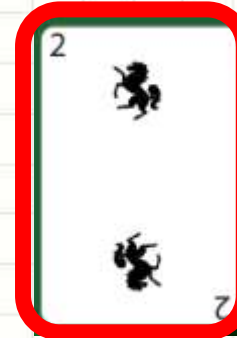
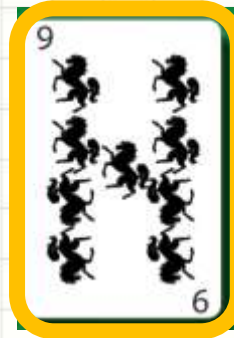
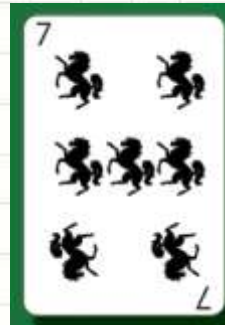
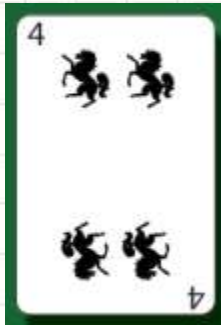
Ordenação por Inserção - Exemplo



Inicial: 3

Atual: 2

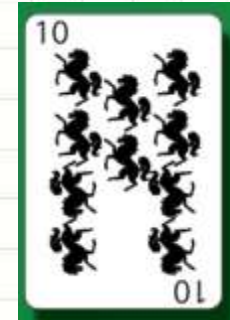
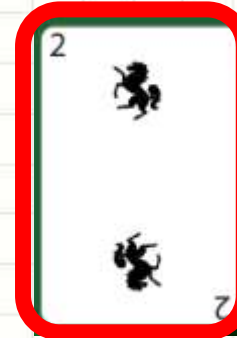
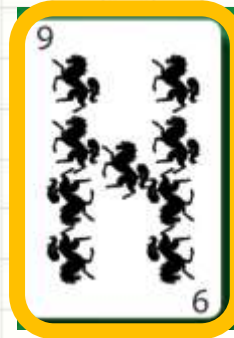
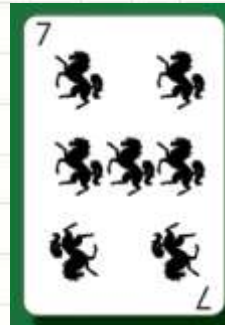
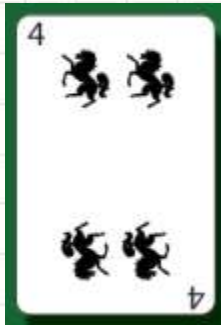
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 2

$2 < 9?$

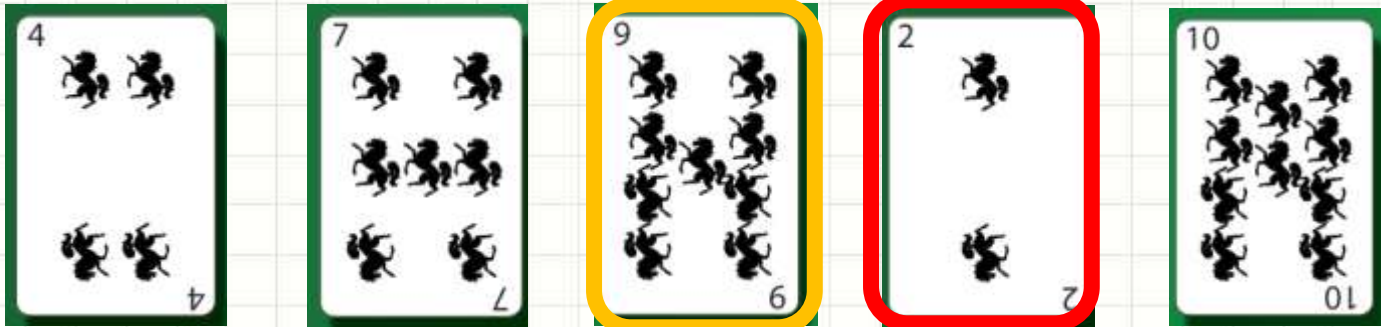
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 2

SIM!

Ordenação por Inserção - Exemplo



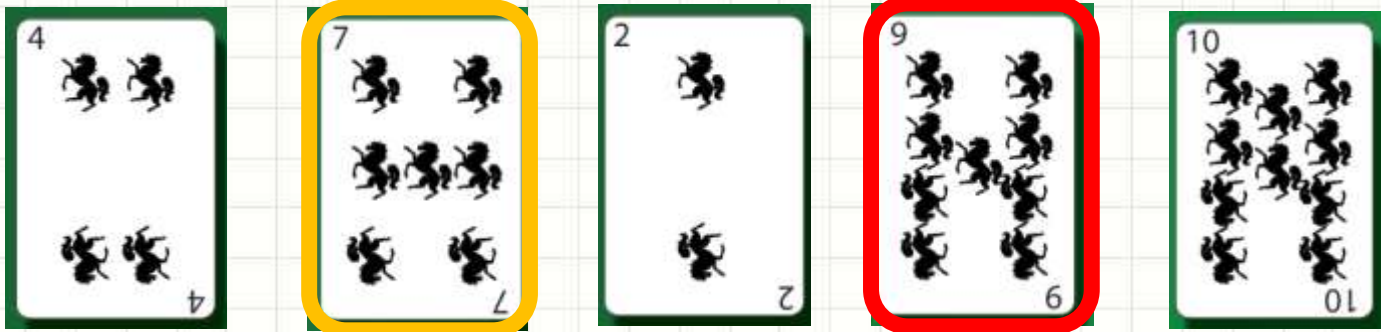
Inicial: 3
Atual: 2

Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 2

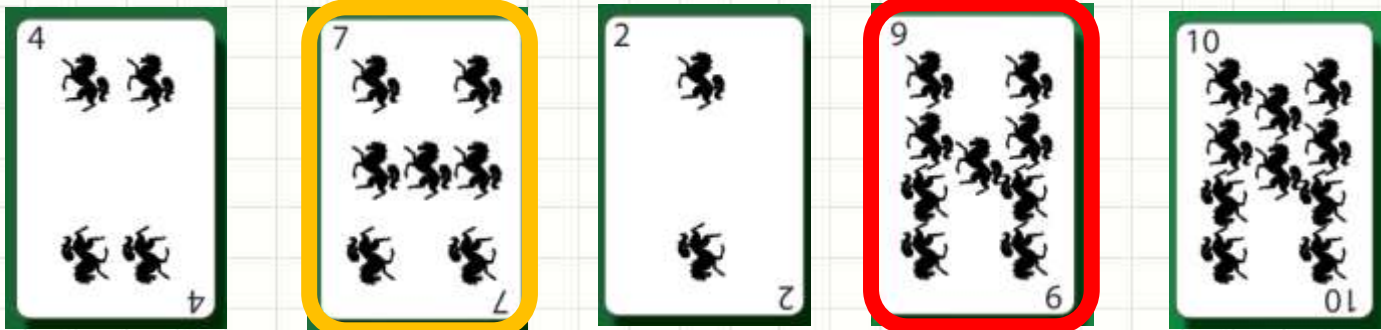
Ordenação por Inserção - Exemplo



Inicial: 3

Atual: 1

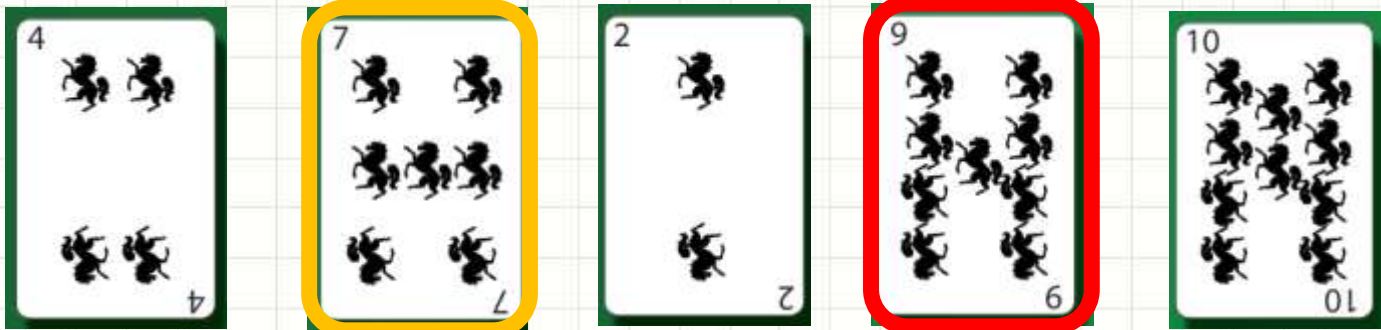
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 1

$2 < 7?$

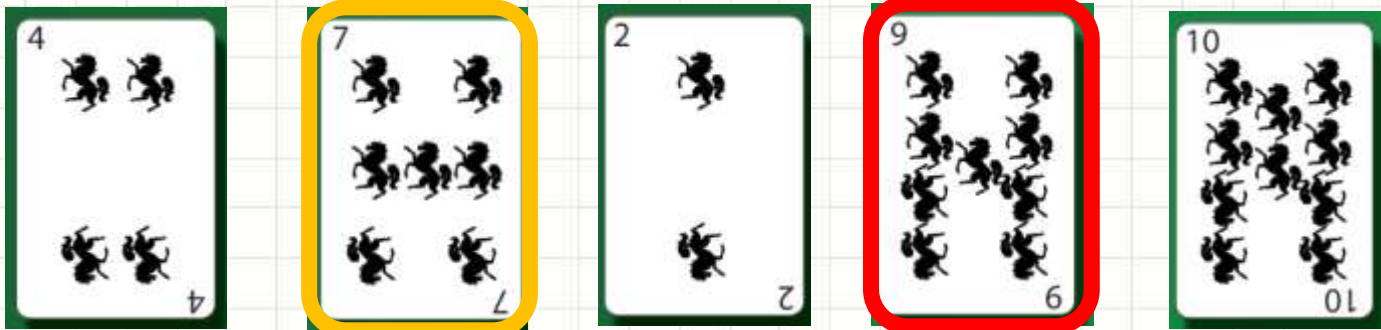
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 1

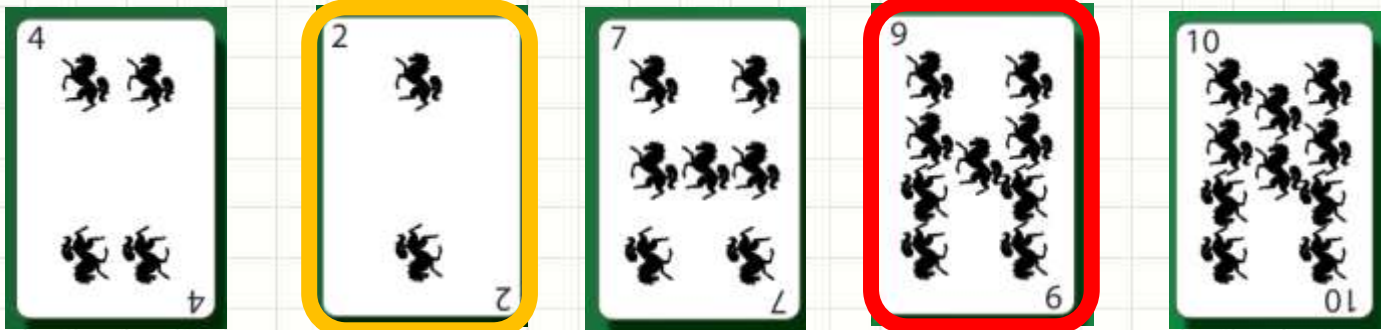
SIM!

Ordenação por Inserção - Exemplo



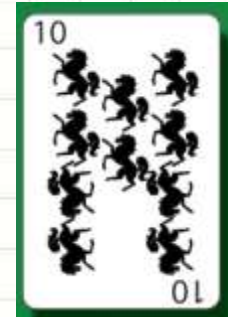
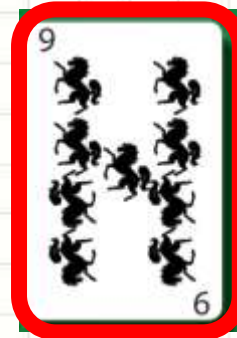
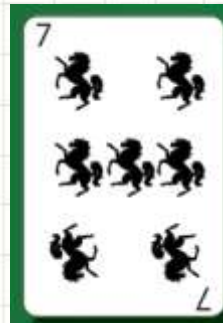
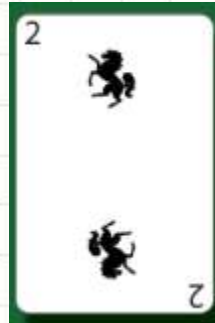
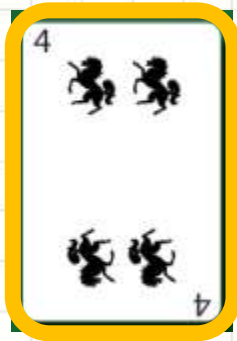
Inicial: 3
Atual: 1

Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 1

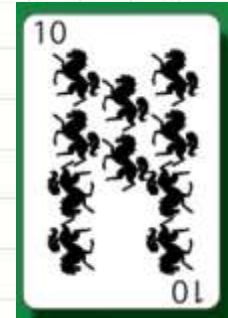
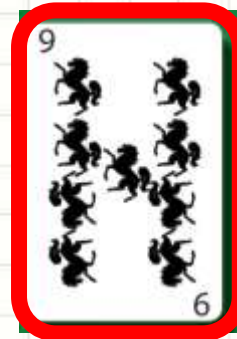
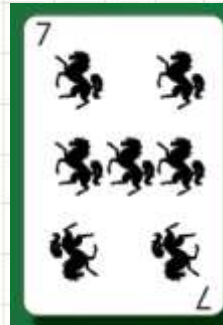
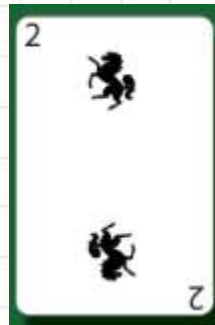
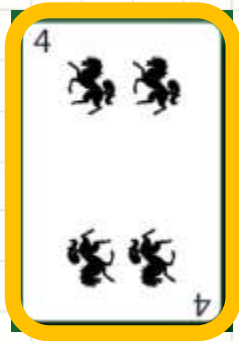
Ordenação por Inserção - Exemplo



Inicial: 3

Atual: 0

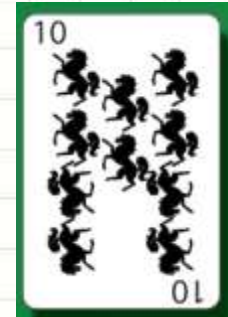
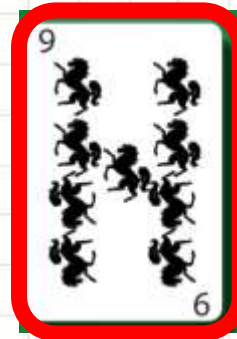
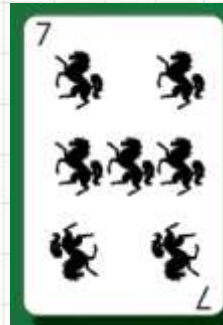
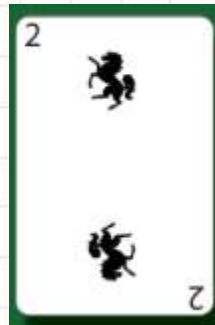
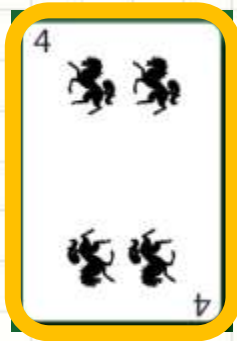
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 0

$2 < 4?$

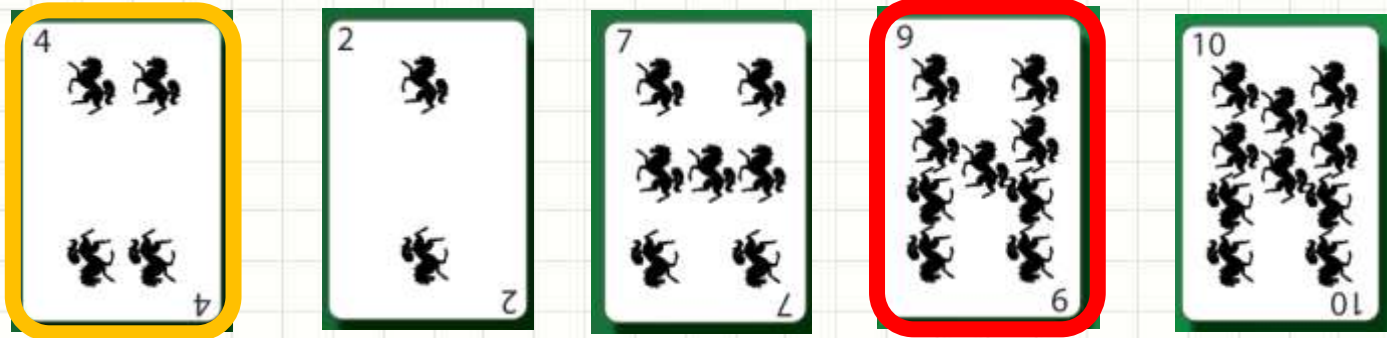
Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 0

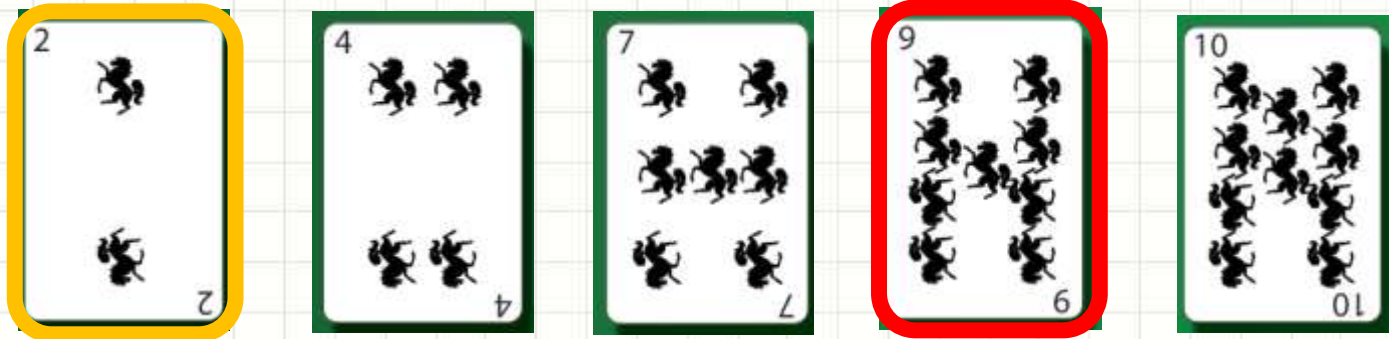
SIM!

Ordenação por Inserção - Exemplo



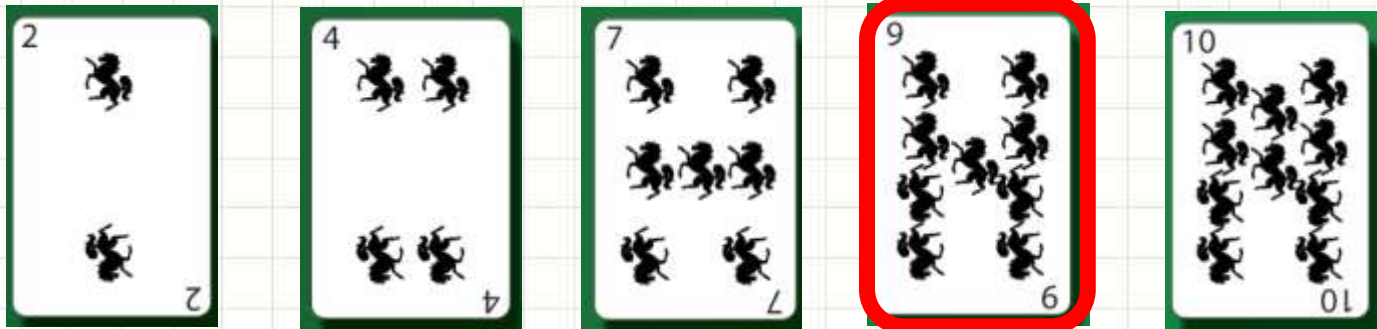
Inicial: 3
Atual: 0

Ordenação por Inserção - Exemplo



Inicial: 3
Atual: 0

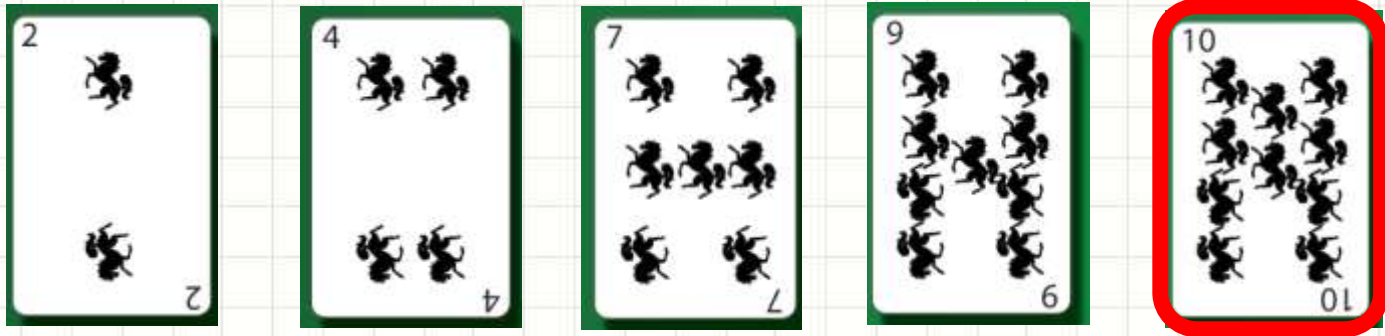
Ordenação por Inserção - Exemplo



Inicial: 3

Atual: 0

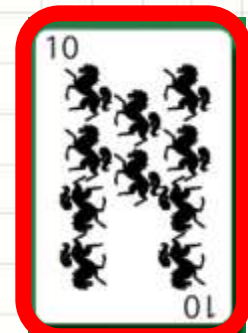
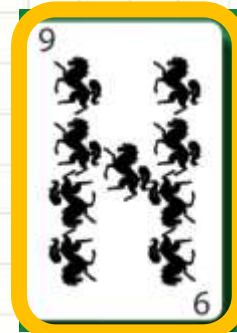
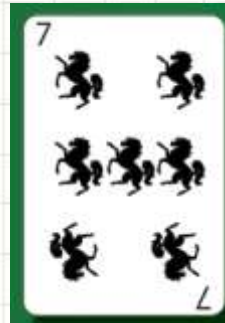
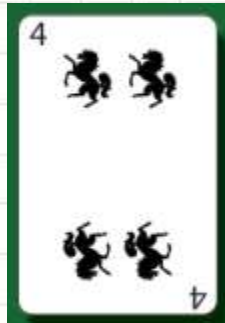
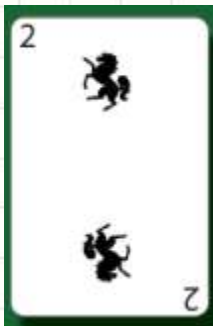
Ordenação por Inserção - Exemplo



Inicial: **4**

Atual: ?

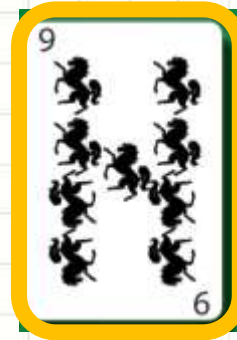
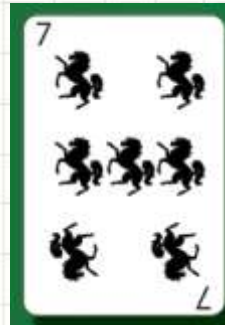
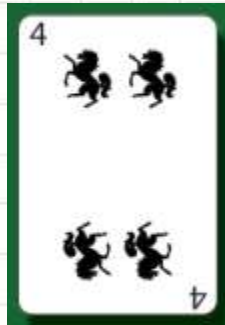
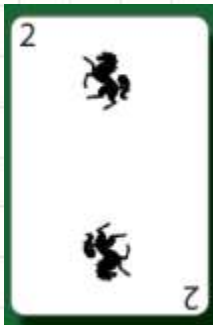
Ordenação por Inserção - Exemplo



Inicial: 4
Atual: 3

$10 < 9?$

Ordenação por Inserção - Exemplo



Inicial: 4
Atual: 3

FIM!

É mais rápido e gasta
menos memória!

Ordenação por Seleção

- Implementando...
 - Lista com n elementos
- Algoritmo
 1. $i=1$
 2. $j = i - 1$
 3. Se valor da pos $j <$ valor da pos $j+1$
 - $j = j - 1$
 - Se $j \geq 0$, volta para 3
 4. $i = i + 1$
 - Se $i \leq n$, volta para 2
- Pegue o código base da aula – **insercao.cpp**



EXERCÍCIO DE FIXAÇÃO

Exercício

- Em um programa, crie uma lista de elementos não ordenados com 50 valores **pares**
- Faça um menu que permita:
 - 1) Ordenar com Bubble Sort (código na aula passada!)
 - 2) Ordenar por Seleção
 - 3) Ordenar por Inserção
- Depois de ordenada pelo método escolhido pelo usuário, a lista deve ser impressa.
- Dica: use como base os programas construídos na aula de hoje!



ENTREGA DOS GRUPOS DE TRABALHO



CONCLUSÕES

Resumo

- Existem diferentes métodos de ordenação
- Dependendo da implementação, pode-se usar mais ou menos memória
- Cada método tem uma eficiência diferente!

- **TAREFA**
 - Estudar!

Próxima Aula



- Lista é a única estrutura?
– Não!
- Vamos ver a Pilha!



PERGUNTAS?



**BOM DESCANSO
A TODOS!**