

week 3, continued







NACHOS
Mozzarella
Corona
ONE WITH A

lunch this Fri 9/26, 1:15pm

cs50.harvard.edu/rsvp

Examination Book



Name _____

Subject _____

Instructor _____

Section _____ Class _____

Date _____ Book No. _____

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bubble sort



4

2

6

8

1

3

7

5

his i

$$(n - 1)$$

$$(n - 1) + (n - 2)$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$n(n - 1)/2$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$n(n - 1)/2$$

$$(n^2 - n)/2$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$n(n - 1)/2$$

$$(n^2 - n)/2$$

$$n^2/2 - n/2$$

1,000,000

$$n^2/2 - n/2$$

$$n^2/2 - n/2$$

$$1,000,000^2/2 - 1,000,000/2$$

$$n^2/2 - n/2$$

$$1,000,000^2/2 - 1,000,000/2$$

$$500,000,000,000 - 500,000$$

$$n^2/2 - n/2$$

$$1,000,000^2/2 - 1,000,000/2$$

$$500,000,000,000 - 500,000$$

499,999,500,000



$$n^2/2 - n/2$$

$$1,000,000^2/2 - 1,000,000/2$$

$$500,000,000,000 - 500,000$$

499,999,500,000

$$n^2/2 - n/2$$

$$1,000,000^2/2 - 1,000,000/2$$

$$500,000,000,000 - 500,000$$

$$499,999,500,000$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$n(n - 1)/2$$

$$(n^2 - n)/2$$

$$n^2/2 - n/2$$

$$(n - 1) + (n - 2) + \dots + 1$$

$$n(n - 1)/2$$

$$(n^2 - n)/2$$

$$n^2/2 - n/2$$

$$O(n^2)$$

O

$O(n^2)$

$O(n)$

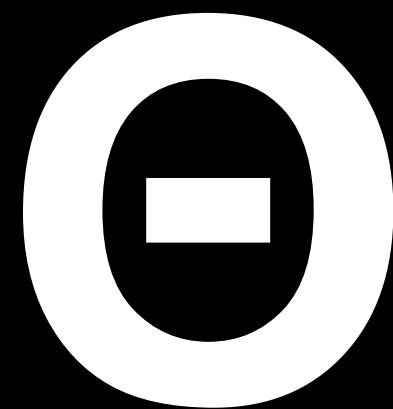
$O(\log n)$

$O(1)$

Ω

$\Omega(n)$

$\Omega(1)$



$\Theta(n)$

selection sort

$O(n^2)$

$$\Omega(n^2)$$

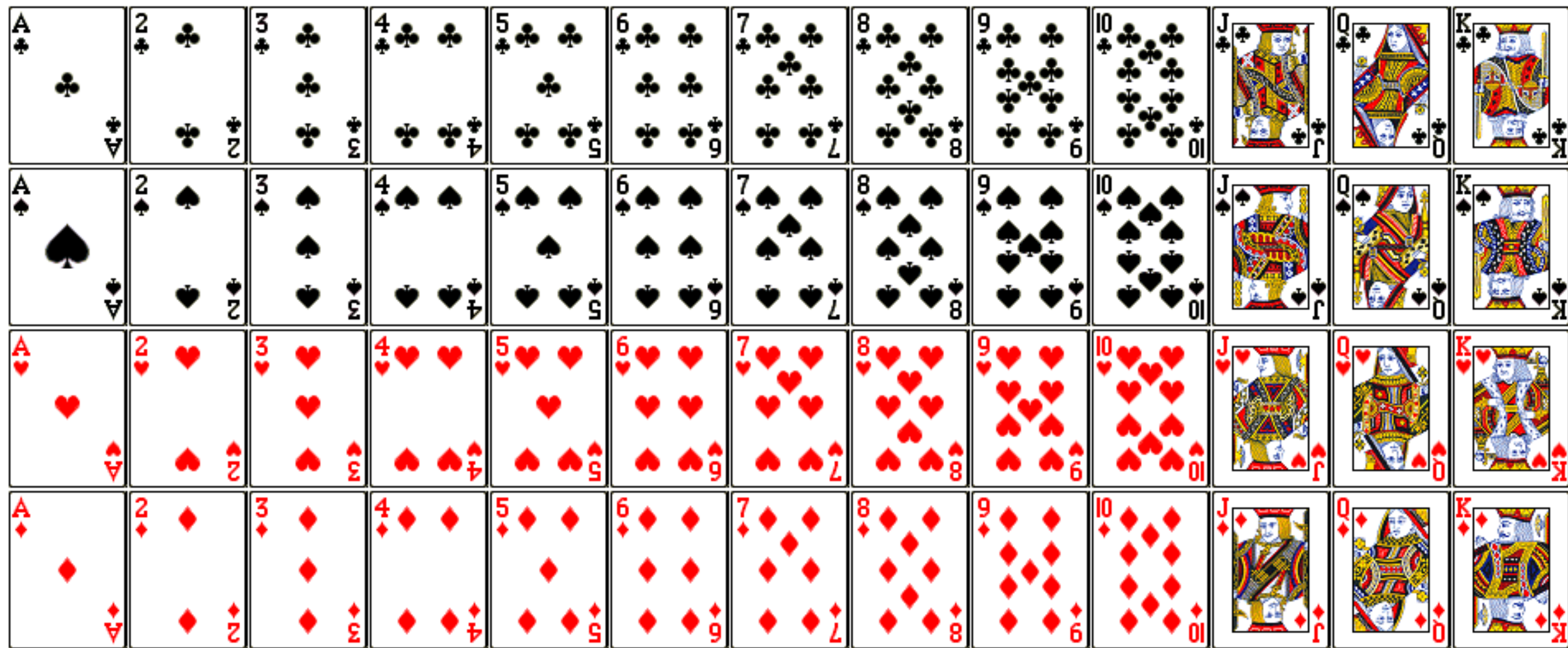
insertion sort

$O(n^2)$

$$\Omega(n^2)$$

bogosort

stupid sort



4

2

6

8

1

3

7

5

```
1  pick up phone book
2  open to middle of phone book
3  look at names
4  if "Smith" is among names
5      call Mike
6  else if "Smith" is earlier in book
7      open to middle of left half of book
8      go to line 3
9  else if "Smith" is later in book
10     open to middle of right half of book
11     go to line 3
12 else
13     give up
```

```
1  pick up phone book
2  open to middle of phone book
3  look at names
4  if "Smith" is among names
5      call Mike
6  else if "Smith" is earlier in book
7      search for Mike in left half of book
8
9  else if "Smith" is later in book
10     search for Mike in right half of book
11
12 else
13     give up
```


merge sort

On input of n elements

if $n < 2$

return

else

sort left half of elements

sort right half of elements

merge sorted halves

$O(n \log n)$

to be continued...