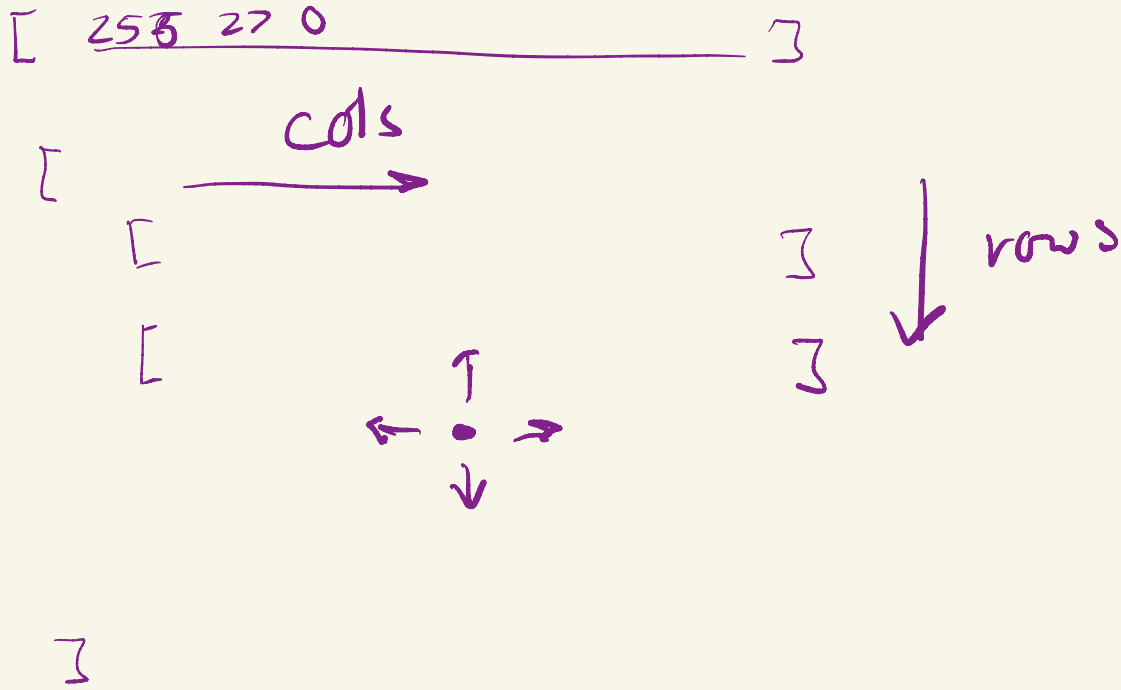
CPE/CSC 101

Today

- Computational Cost
- Toward 202

- Quiz

- Office Hours
  Tuesday
  9:45 - 10:45


255 27 0
cols
rows

linear search

[↑ ↑ ↑ ↑ X] N elements

worst case : on order of N operations

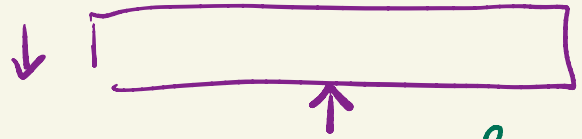
sorted list?

$n > e_i$

[e_0

find n

$n < e_i$



e_{n-1}] N elements

$e_0 <= e_1 <= \ldots \ldots e_{n-2} \leq e_{n-1}$

binary search

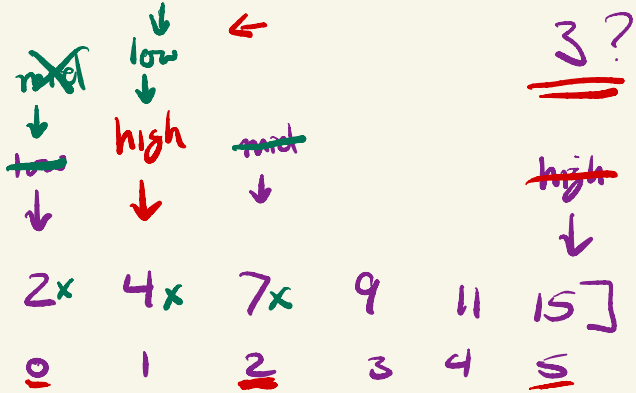
n == list [len/2]

N elements

1	N
1	N/2
1	N/4
1	
⋮	
	log N

```
def binary_search(nums: List[int], value: int) ->
                                    Optional[int]:
    low = 0
    high = len(nums) - 1
    while (low <= high):
        mid = low + (high - low) // 2
        if value > nums[mid]:
            low = mid + 1
        elif value < nums[mid]:
            high = mid - 1
        else:
            return mid

    return None
```



11?

[2 4 7 9 11 15]

0 1 2 3 4 5

mid low mid high

$$low + (high - low) // 2$$

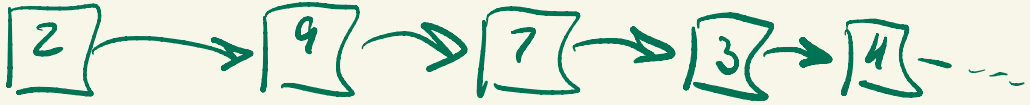
$$3 + (5 - 3) // 2$$

202

data structures

- list (array)

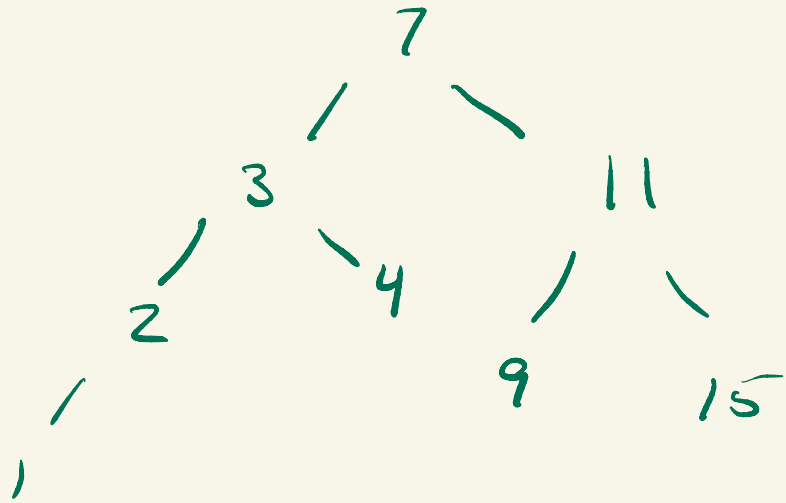
- list (linked)




```
class Node:
    def __init__(value: int, next: Node):
```

tree

- empty
- node w/ value
  two subtrees



lists

trees

hashtables
(dictionary)

complexity

running time

203

object-oriented design & programming

```
class Point:
    def __init__(....)

    def __eq__(....)

    def distanceTo(self, other: Point):
```

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C & systems programming