queue

enqueue → dequeue

implement array with wraparound

A [front] [back]

--- later ---

[back] [front]
Implement queue using 2 stacks

Stack

Queues

1) Pseudo-code
   - Pop
   - Push

2) Analysis
   - Pop O(n)
   - Push O(1)

Q1

5
3

Push 3, 5
Pop

Q2

5
3

Copy contents of Q1 into Q2 until last element
Return last element
Move Q2 back to Q1

3
Pseudo-code for pop

```
while (!Q1.isEmpty())
    x = Q1.dequeue()
    if (Q2.isEmpty())
        Q2.enqueue(x)

// copy back
while (!Q2.isEmpty())
    Q1.enqueue(Q2.dequeue())

// done
return x // last value that was on Q1
```

If n elements are moved, the time is O(n)
queue "traversal"

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z

ACB1G4
reconstruct tree from traversal sequence

pre: ABCDIEJFCGKHH
m: IDJBFGKHCH

A

pre: EBDIJF
m: IDJGKF

GKH

represent tree
2n locations