Learning Objectives

Practice using the stack and the queue
Stack ADT

**Order:** Last-in, First-Out

**Operations:**

- **Push( )** - Add to top of stack
- **Pop( )** - Remove and return the top item
- **Top( )** - Looks at top item's value
Queue ADT

Order: First-in, First-Out

Operations:

- Enqueue() - Adds to back of queue
- Dequeue() - Removes from front
- Front() - Gets value at front
Programming Practice

For each problem consider:

Do I know what the problem is asking me to do?

What values in the stack or queue are relevant? How can I access them?

Do I need any additional data structures to solve the problem?
isBalanced(queue)

1) Same amount of "[" and "]" to be balanced.

2) The order of brackets matters.

Example:

[[ ]]  

First:  

[[ ]]  

Back:  

[ ]  

0 1 2 3 4  

[[ ]]  

Ignore non "]" 

"[" is removed and "]" but I have no blocks!
isBalanced(queue)

How do we know when a string is unbalanced?

If we track \textit{order} and \textit{count} of \textquotedbl{}\textasciitilde\textquotedbl{}, we can identify when there is no \textit{closed} bracket.

What values in my input queue do I need?

\texttt{\textquote{\textasciitilde\textquote}}

How can I track these values?

\texttt{??}
leftRotateQueue

\[
\begin{align*}
\text{left} & \quad \text{right} \\
[a, b, c, d] & \quad [a, b, c, d] \\
[b, c, d, a] & \quad 1 \\
[c, d, a, b] & \quad 2 \\
[d, a, b, c] & \quad 3 \\
[a, b, c, d] & \quad 4 \\
\end{align*}
\]

\[
\begin{align*}
x &= \{a, b, c, d\} \\
\texttt{c} &= x.\texttt{dequeue}() \quad \# c = a \\
\# x &= \{b, c, d\} \\
x.\texttt{enqueue}(c) \\
\# \{b, c, d, a\}
\end{align*}
\]
leftRotateQueue

[70x481]

How do we know which rotation we need?

$X \ x \ y \ \text{length} = \text{rotation}$

What values in my input do I need to access?

$\Rightarrow \ \text{an offset \ # \ of \ values}$

What do I do with every item I access?

???
removeOdds(stack)

[1, 2, 3, 4, 5] →

\[ x = s.pop() \]

what do I do w/ \( x \)?
removeOdds(stack)

Can we remove some stack values and not others?

\(\text{No! We only have } \text{push(1) \& pop()}\)

What values in my input do I need to access?

\(\text{All of them}\)

What do I do with every item I access?

\(\text{You decide}\)
mergeSortedQueues

[1, 2, 3, 4, 5], [4, 5, 6, 7, 8]

New queue [1, 2, 3, 4, 4, 5, 5, 7, 8]
mergeSortedQueues

[1, 2, 3, 4, 5], [4, 5, 6, 7, 8]

[1, 2, 3, 4, 4, 5, 5, 6, 7, 8]

What values in my input do I need to access?

⇒ All items!

What do I do with every item I access?

⇒ Add to new queue! How do I track order?

Do I need a new data structure?
reverseStack

[1, 2, 3, 4, 5]
reverseStack

[1, 2, 3, 4, 5]

[5, 4, 3, 2, 1]

Can I change the values in my stack directly?

<> No!

What values in my input queue do I need?

<> All of them

What should I do with the values I pop?