CS121 Review

Spring 2021
Understanding of data structures

• Stack
  • Notation, -: pop and print, everything else: push
  • Input: it was - the best - of times - - - it was - the - -
  • What’s the printed output?

• What’s left in the stack?
Understanding of data structures

• Queue
  • Notation, -: dequeue and print, everything else: enqueue
  • Input: it was - the best - of times - - - it was - the - -
• What’s the printed output?

• What’s left in the queue?
Tracing the Code

Stack<Integer> s = new Stack<Integer>();
while (n > 0) {
    s.push(n % 2);
    n = n / 2;
}
while (!s.isEmpty())
    System.out.print(s.pop());
System.out.println();

• What is the printed output for
  • n = 6?
  • n = 7?
  • n = 8?

• How is the printed output related to n?
Tracing the Code

```java
Queue<Integer> q = new Queue<Integer>();
q.enqueue(0);
q.enqueue(1);
for (int i = 0; i < 10; i++) {
    int a = q.dequeue();
    int b = q.dequeue();
    q.enqueue(b);
    q.enqueue(a + b);
    System.out.println(a);
}
```

- What is the printed output?
- What is the functionality of this code segment?
Tracing the Code

Suppose x is a linked list and t is a node.

What does the following code segment do?

```java
  t.next = x.next;
  x.next = t;
```

How about the following code segment?

```java
  x.next = t;
  t.next = x.next;
```
Tracing the Code

- What is the printed output?

```java
private static void traverse(Node x) {
    if (x == null) return;
    StdOut.println(x.key);
    traverse(x.left);
    traverse(x.right);
}
```

- Is this traversal pre-order, in-order, post-order, or level-order?
Problem Solving

3-Sum (Revisited)

3-Sum. Given $n$ distinct integers, find three such that $a + b + c = 0$.
Goal. $\Theta(n^2)$ expected time; $\Theta(n)$ extra space.

• Describe your main idea in English and your algorithm in pseudo-code.