## 1 Exercises

**Exercise 1.** Consider the following function:

```
public static int mystery(Node<Integer> first) {
    int x = 0;
    for (Node y = first, int i = 0; y != null; y = y.next, i++) {
        x += (i % 2 == 0) ? y.item : 0;
    }
    return x;
}
```

a. What does mystery() compute and return in general?

b. What will mystery() return if the argument a represents a linked list containing integers  $1, 2, 3, \ldots, 10$ ?

**Exercise 2.** Consider the following function:

```
public static int mystery(Bag<Integer> bag) {
    int x = 0;
    Itereator<Integer> iter = bag.iterator();
    while (iter.hasNext()) {
        x += iter.next();
    }
    return x;
}
```

a. What does mystery() compute and return in general?

b. What will mystery() return if the argument a represents a bag containing the integers 1, 2, 3, ..., 10?

**Exercise 3.** Suppose that a minus sign in the input indicates pop the stack and write the returned value to standard output, and any other string indicates push the string onto the stack. Further suppose that following input is processed:

it was - the best - of times - - - it was - the - - worst - of times -

a. What is written to standard output?

b. What are the contents (from top to bottom) left on the stack?

**Exercise 4.** Suppose that an intermixed sequence of (stack) push and pop operations are performed. The pushes push the integers 0 through 9 in order; the pops print out the return value. Which of the following sequence(s) could not occur?

```
A. 4 3 2 1 0 9 8 7 6 5
B. 4 6 8 7 5 3 2 9 0 1
C. 2 5 6 7 4 8 9 3 1 0
D. 4 3 2 1 0 5 6 7 8 9
E. 1 2 3 4 5 6 9 8 7 0
F. 0 4 6 5 3 8 1 7 2 9
G. 1 4 7 9 8 6 5 3 0 2
H. 2 1 4 3 6 5 8 7 9 0
```

Exercise 5. Consider the following code fragment:

```
Stack<Integer> s = new Stack<Integer>();
while (n > 0) {
    s.push(n ½ 2);
    n = n / 2;
}
while (!s.isEmpty()) {
    StdOut.print(s.pop());
}
StdOut.println();
```

a. What does the code output when n is 50?

b. What does the code output in general for a non-negative integer n?

**Exercise 6.** Suppose that a minus sign in the input indicates dequeue the queue and write the return value to standard output, and any other string indicates enqueue the string onto the queue. Further suppose that following input is processed:

it was - the best - of times - - - it was - the - - worst - of times -

a. What is written to standard output?

b. What are the contents (from front to back) left on the queue?

**Exercise 7.** Suppose that a client performs an intermixed sequence of (queue) enqueue and dequeue operations. The enqueue operations put the integers 0 through 9 in order onto the queue; the dequeue operations print out the return value. Which of the following sequence(s) could not occur?

A. 0 1 2 3 4 5 6 7 8 9 B. 4 6 8 7 5 3 2 9 0 1 C. 2 5 6 7 4 8 9 3 1 0 D. 4 3 2 1 0 5 6 7 8 9

**Exercise 8.** What does the following code fragment do to the queue q?

```
Stack<String> s = new Stack<String>();
while(!q.isEmpty()) {
    s.push(q.dequeue());
}
while(!s.isEmpty()) {
    q.enqueue(s.pop());
}
```

# 2 Solutions

#### Solution 1.

a. Computes and returns the sum of every other integer in node, starting at the first.

b. 25

#### Solution 2.

a. Computes and returns the sum of the integers in bag.

## b. 55

#### Solution 3.

 $\operatorname{a}\nolimits$  . was best times of the was the it worst times

 $b.\ {\tt of it}$ 

## Solution 4. $\ensuremath{\mathtt{B}}$ , $\ensuremath{\mathtt{F}},$ and $\ensuremath{\mathtt{g}}$

## Solution 5.

a. 110010

b. Prints the binary representation of  $\tt n.$ 

## Solution 6.

 $\operatorname{a.}$  it was the best of times it was the worst

 $b.\ {\rm of\ times}$ 

Solution 7.  $\ensuremath{\mathtt{B}}$  , c, and  $\ensuremath{\mathtt{D}}$ 

Solution 8. Reverses the items on the queue.