

- 1 Add a method, `peek()`, to `Stack` that returns the most recently inserted element on the stack, without removing it. (3)
- 2 Add a method, `isEmpty()`, to `Stack` that returns `true` if there are no elements in the stack and `false` otherwise. (3)
- 3 Suppose that a client performs an intermixed sequence of `push()` and `pop()` operations on a stack of integers. The push operations put the integers 0 through 9, in order, on the stack; the pop operations print out the return value. Which of the following sequence(s) could *not* occur? (5)

a. 4 3 2 1 0 9 8 7 6 5	e. 1 2 3 4 5 6 9 8 7 0
b. 4 6 8 7 5 3 2 9 0 1	f. 0 4 6 5 3 8 1 7 2 9
c. 2 5 6 7 4 8 9 3 1 0	g. 1 4 7 9 8 6 5 3 0 2
d. 4 3 2 1 0 5 6 7 8 9	h. 2 1 4 3 6 5 8 7 9 0
- 4 Suppose `stack` is an object representing an implemented stack of integers. What does the following code fragment print when `N` is 50? Explain what your output represents (you might want to try additional values for `N` to verify your answer). (5)


```
while (N > 0) {
    stack.push(N % 2);
    N = N / 2;
}
while (!stack.isEmpty()) {
    System.out.print(stack.pop())
}
System.out.println()
```
- 5 Write the method `Parentheses()` that takes a string of different parentheses and uses a stack to determine whether its parenthesis are properly balanced. For example, your method should return `true` for "[()]{[(())]()}" and `false` for "[()]". (10)

Hint: Use the `substring()` method of the `String` class.
- 6 Suppose that we have a sequence of intermixed `push()` and `pop()` operations on a stack of integers. The push operations put the N integers, 0 through $N - 1$, in order on the stack; the pop operations print out the return value. Write the method, `ValidPermutation()`, that will return `true` if a given string representing a space-separated sequence of these integers represents valid output for this stack and `false` otherwise. (20)

Hint #1: Your method should also take `N` as a parameter.

Hint #2: This method should be able to answer Question #3 for you.

Hint #3: The `split()` method of the `String` class may be useful.