Sheet 3
Stacks

1. **Suppose an initially empty stack S has performed a total of 25 push operations, 12 top operations and 10 pop operations. Three of the pop operations generated "Empty Stack Exception", which were caught and ignored.**

1. What is the size of S after performing the operations described above?
2. If this stack is implemented as an array, what is the value of the "top" data member of the Stack class?

2. **Describe the output of the following series of stack operations:**
```
push(5), push(3), pop(), push(2), push(8), pop(), push(9), push(1),
pop(), push(7), push(6), pop(), pop(), push(4), pop(), pop().
```

Assume that the stack was empty before performing the first operation. Draw the contents of the stack after each operation.

3. **Write an algorithm that returns the number of elements in a stack leaving it unchanged.** (Assume that the stack Abstract Data Type provides only `pop` and `push` operations).

4. **Write an algorithm that uses a stack to determine if an HTML document is well-formed. (A well-formed HTML document should have all tags properly nested and all opened tags should have the corresponding closing tags).**

5. **A palindrome is a word or a phrase that is the same when spelled from the front or the back. For example reviver and able was I ere I saw elba are both palindromes. Write an algorithm that uses a stack to determine if a word or a phrase is a palindrome.**

6. **Write an algorithm that doing the following on the stack leaving it unchanged:**
1. Return an identical copy of the Stack.
2. Return a reversed copy of the Stack.
3. Return a sorted copy of the Stack in descending order.
4. (Assume that the stack Abstract Data Type provides only `pop, push, peak, and isEmpty` operations).