

Week 3 – Lab B Assignment (Stack and Queues)

Q1) Consider the following statements:

```
stackType<int> stack;
int x, y;
what is output of the following segment of code:
x = 4;
y = 0;
stack.push(7);
stack.push(x);
stack.push(x + 5);
y = stack.top();
stack.pop();
stack.push(x + y);
stack.push(y - 2);
stack.push(3);
x = stack.top();
stack.pop();
cout << "x = " << x << endl;
cout << "y = " << y << endl;
while (!stack.isEmptyStack())
{
cout << stack.top() << endl;
stack.pop();
}
```

2) Write a program with and without STL that uses a stack to print the prime factors of a positive integer in descending order.

3) Write a program to split a stack into two stacks with one containing the bottom half elements and the second the remaining elements; and to combine two stacks into one by placing all elements of the second stack on top of those of the first stack.

4) Write a program to convert a number from decimal notation to a number expressed in a number system whose base (or radix) is a number between 2 and 9. The conversion is performed by repetitious division by the base to which a number is being converted and then taking the remainders of division in the reverse order. For example, in converting to binary, number 6 requires three such divisions: $6/2 = 3$ remainder 0, $3/2 = 1$ remainder 1, and finally, $1/2 = 0$ remainder 1. The remainders 0, 1, and 1 are put in the reverse order so that binary equivalent of 6 is equal to 110.

5) Write a program to convert (a) given postfix to prefix (b) given prefix to postfix (c) given infix to postfix and further evaluate it to obtain the computed value.

$(4 + 9 * 6) - ((8 - 6) / 2 * 4) * 9 / 3$

6) Write a program to check for balancing symbols in the following languages: /* */, (), [], {} .

7) Write a program to compress a given text by removing whitespaces and replacing continuously repeated character by character followed by no. of time, it is repeated. Use queue data structure.

e.g. if input is : asd ddfghjdff kj

Output should be: asd3fghjdf2kj

8) Write the definition of the function **moveNthFront** that takes as a parameter a positive integer, n. The function moves the nth element of the queue to the front. The order of the remaining elements remains unchanged.

For example, suppose

queue = {5, 11, 34, 67, 43, 55} and n = 3.

After a call to the function moveNthFront,

queue = {34, 5, 11, 67, 43, 55}.

9) Write a program that reads a line of text, changes each uppercase letter to lowercase, and places each letter both in a queue and onto a stack. The program should then verify whether the line of text is a palindrome (a set of letters or numbers that is the same whether read forward or backward).

10) A String of characters is given. A scientist is interested in a very typical pattern. He wishes to reverse all the characters which lies inside 2 substrings namely S1, and S2. S1 is the string of any length but starts from X and ends with Y. S2, starts from Y and ends with X. For Example: If input string is "ABXNNYPEROYABCDXCT", then output is : OREP. Write a Program to solve this problem.