2-Stacks and Queues

**Writing exercises**

1. Assume that x, y, z are integer variables and that s is a stack of integers, state the output of each program fragment.

x = 3;y = 5;z = 2;

s.makeEmpty( );

s.push(x);s.push(4);s.pop(); // 3

s.push(y);s.push(3); s.push(z); // 3 5 3 2

s.pop();s.push(2);s.push(x); // 3 5 3 2 3

while(! s.isEmpty( )) System.out.println(s.pop() + " ");

**The output of the program:** 3 5 3 2 3

2. x = 3; y = 1;

s.makeEmpty();

s.push(5);s.push(7);s.pop(); // 5

x += y; // x = 4

s.pop(); // rỗng

s.push(x);s.push(y); s.push(2);s.pop();s.pop(); // 4

while (! s.isEmpty( ))

{

y = s.pop(); // y = 4

System.out.println(y);

}

System.out.println("x = " + x);

System.out.println("y = " + y);

**The output of the program:**

4

x = 4

y = 4

3. A letter means push and an asterisk means pop in the following sequence. Give the sequence of values returned by the pop operations when this sequence of operations is performed on an initially empty stack.

E A S \* Y \* Q U E \* \* S T \* I O \* N \* \* \*

**The sequence of values returned by the pop operations:**

S Y E U T O N I S

4. A letter means push and an asterisk means pop in the following sequence. Give the contents of s[0], ..., s[4] after this sequence of operations is performed on an initially empty stack (the stack is implementated by array s[]).

L A \* S T I \* N \* F I R \* S T \* O U \* T \* \* \* \*

**The contents of s[0], ..., s[4]:**

s[0] = L

s[1] = S

s[2] = T

s[3] = F

s[4] = I

5. A letter means enqueue and an asterisk means dequeue in

the following sequence. Give the sequence of values returned

by the dequeue operation when this sequence of operations is performed on an initially empty queue.

E A S \* Y \* Q U E \* \* S T \* \* I O \* N \* \*

**The sequence of values returned by the dequeue operation:**

I O N

6. A letter means enqueue and an asterisk means dequeue in the following sequence. Give the contents of q[0], ..., q[4] after this sequence of operations is performed on an initially empty queue (the queue is implementated by circular array q[] with size 5).

E A S \* Y \* Q U E \* S T \* \* I O \* N \* \*

**The contents of q[0], ..., q[4]:**

q[0] = T

q[1] = I

q[2] = O

q[3] = N

q[4] = null