10. Rewrite the stack Push algorithm presented in this chapter (see textbook page 133) assuming that top was initialized to 0 instead of −1.

if(top == size) return false;

else

{

data[top] = newNode.deepCopy();

top++

return true;

}

11. Rewrite the stack Pop algorithm presented in this chapter (see textbook page 134) assuming that top was initialized to 0 instead of −1.

if(top == 0) return null;

else

{

top--;

return data[top];

}

*The key to these two is that there are two choices. In push you can increment first and then push or you can push first and then increment. Whichever push does, pop must do the opposite. So that if push increments first then pop must pop first and then decrement and vice-versa.*

12. Give the line numbers of the code presented in **Figure 3.13** (see textbook page 140) that perform the garbage collection for the structure Stack.

*The nature of the Stack is such that no garbage collection is ever required. The purpose of garbage collection is to free unused memory in the middle of a block.*

13. Evaluate the following arithmetic expressions written in postfixed notation:

a) 45 3 21 + − 10 \* 210

b) 3 6 \* 45 2 + \* 846

c) 12 3 \* 2 / 18

14. Write the following arithmetic expressions in postfixed notation:

a) 45 + 6/2 45 6 2/+

b) (3 + 4 + 7) / 2 3 4+7+2/

c) (b2 − 4 \* a c) / (2 a) b2^4a\*c\*-2a\*/

15. Nodes A, B, and C are placed on an initialized queue in the order first A, then B, and  
finally C.

a) Draw a picture of the queue using the standard abstract graphic. **Note:** Examples of this may be found in Figure 3.19 and Figure 3.20 in the textbook on page 149. You may do a, b, and c on the same diagram.

|  |  |  |
| --- | --- | --- |
| a | b | c |

Front ↑ Rear ↑

b) Indicate the position of the rear of the queue.

c) Indicate the position of the front of the queue

d) A Dequeue operation is performed. What node is returned?

*Node a is returned.*

16. In the implementations of the structure Queue presented in this chapter, what is stored in the memory cells front and rear?

*The addresses of the memory locations for the front and the rear of the queue respectively.*

17. Give the integer range of the values that rear can assume after the statement:  
rear = x % 54; executes (assume x is an integer). 0..53

18. Give the line numbers of the code presented in **Figure 3.26** (see textbook page 160) that perform the garbage collection for the structure Queue.

*There are two. One is in the enque method and one in the deque method. The important thing is retaining the circular queue. Lines 27 and 37.*