```
6 1 2 3 2 3 2 3 2 1 2 3 2 1
```

8. Circular queue

Please implement a circular queue **using an array** in C. Please program the enqueue(), dequeue(), and display() functions. The length of an array is defined as six; as a result, there are five spaces to store data. In the input file, we define 1 as enqueue() with a data separated by a space; 2 as dequeuer(), and 3 as display().

Note: You must use an array to implement a circular queue; otherwise, no points will be given.

Test Case

Please test your program with Input1 and Input2, and then check the answers with Output1 and Output2.

Listing 8: Circular queue

```
1  Input1:
2  3
3  1 5
4  1 10
5  3
6  2
7  1 15
8  1 20
9  3
10 Output1:
11 The queue is empty.
12 5 10
13 10 15 20
14 Input2:
15 1 3
16 1 5
17 1 7
18 1 9
19 1 11
20 3
21 1 13
22 2
```

```
2
3
Output2:
3 5 7 9 11
The queue is full.
7 9 11
```

9. Implement a binary search tree with linked lists

Please implement a binary search tree with linked lists and traversal with in-order, post-order, pre-order. The input consists of a sequence of numbers. You must build a binary search tree according to the input order. The output includes three lines of the results: (1) the in-order traversal, (2) the post-order traversal, and (3) the pre-order traversal.

Note: You must use linked lists; otherwise, no points will be given.

Test Case

Please test your program with Input, and then check the answers with Output.

Listing 9 : Implement a binary search tree with linked list

```
Input：
4 6 8 9 12 5 7

Output：
4 5 6 7 8 9 12
5 7 12 9 8 6 4
4 6 5 8 7 9 12
```

10. Insert and delete a number of binary search tree

Implement a binary search tree with insert(x) and delete(x) functions using an array. You must build a binary search tree according to the input order. The input consists of a sequence of numbers in the first line. The insert/delete function and the number to be insert/deleted are shown in the remaining lines. For the delete operation, you must use the node with the largest key from the left sub-tree to replace the deleted node. Finally, print out the entire tree in level order from the top to the down. If there are more than two numbers in the same level, you should print out the numbers from the left to the right