Started on	Sunday, 18 September 2022, 6:36 PM
State	Finished
Completed on	Sunday, 18 September 2022, 6:40 PM
Time taken	4 mins 9 secs
Marks	9.00/9.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Which statement is true?

Select one:

- a. Queues require linked lists, but stacks do not.
- b. Stacks require linked lists, but queues do not.
- c. Queues use two ends of the structure; stacks use only one. ✔
- d. Stacks use two ends of the structure, queues use only one.

The correct answer is: Queues use two ends of the structure; stacks use only one.

Question **2**

Correct

Mark 1.00 out of 1.00

If the characters 'D', 'C', 'B', 'A' are placed in a queue (in that order), and then removed one at a time, in what order will they be removed?

Select one:

- a. ABCD
- b. ABDC
- c. DCAB
- d. DCBA ✔

The correct answer is: DCBA

Question **3**

Correct

Mark 1.00 out of 1.00

In the linked list implementation of the queue class, where does the insert method place the new entry on the linked list?

Select one:

- a. At the head.
- b. At the tail. ✔
- c. After all other entries that are greater than the new entry.
- d. After all other entries that are smaller than the new entry.

The correct answer is: At the tail.

Question **4**

Correct

Mark 1.00 out of 1.00

Study the following three pieces of code. Comments have been removed intentionally.
Can you guess what each does?

(i)

```
public class ProcForInts {
  private int[] items = new int[10];

  private int top = 0;

  /**
   * Procedure
   */
  public void push( int N ) {
     if (top == items.length) {
        int[] newArray = new int[ 2*items.length ];
        System.arraycopy(items, 0, newArray, 0, items.length);
        items = newArray;
     }
     items[top] = N;
     top++;
  }

  /**
   * Procedure
   */
  public int pop() {
     if ( top == 0 )
       throw new IllegalStateException("Can't...");
     int topItem = items[top - 1]
     top--;
     return topItem;
  }

  /**
   * Procedure
   */
  public boolean isEmpty() {
    return (top == 0);
  }
}
```

(ii)

```
public class ProcForInts {
  /**
   * Procedure
   */
  private static class Node {
    int item;
```

```
    Node next;
  }
  private Node head = null;

  private Node tail = null;
  /**
   * Procedure
   */
  public void enqueue( int N ) {
    Node newTail = new Node();
    newTail.item = N;
    if (head == null) {
      head = newTail;
      tail = newTail;
    }
    else {
      tail.next = newTail;
      tail = newTail;
    }
  }

  /**
   * Procedure
   */
  public int dequeue() {
    if ( head == null)
       throw new IllegalStateException("Can't...");
    int firstItem = head.item;
    head = head.next;
    if (head == null) {
        tail = null;
    }
    return firstItem;
  }

  /**
   * Procedure
   */
  boolean isEmpty() {
    return (head == null);
  }

}
```

(iii)

```
public class ProcForInts {
  private static class Node {
    int item;
    Node next;
  }

  private Node top;

  /**
```

```
   * Procedure
   */
  public void push( int N ) {
    Node newTop;
    newTop = new Node();
    newTop.item = N;
    newTop.next = top;
    top = newTop;
  }

  /**
   * Procedure
   */
  public int pop() {
    if ( top == null )
      throw new IllegalStateException("Cannot...");
    int topItem = top.item;
    top = top.next;
    return topItem;
  }

  /**
   * Procedure
   */
  public boolean isEmpty() {
    return (top == null);
  }
}
```

Select one:

- a. (i) is a linked list implementation of a stack; (ii) is an array implementation of a stack; (iii) is a queue
- b. (i) is an array implementation of a stack; (ii) is a linked list implementation of a stack; (iii) is a queue
- c. (i) is a queue; (ii) is a linked list implementation of a stack; (iii) is an array implementation of a stack
- d. (i) is an array implementation of a queue; (ii) is a linked list implementation of a queue; (iii) is a stack
- e. (i) is an array implementation of a stack; (ii) is a queue; (iii) is a linked list implementation of a stack ✔

The correct answer is: (i) is an array implementation of a stack; (ii) is a queue; (iii) is a linked list implementation of a stack

Question **5**

Correct

Mark 1.00 out of 1.00

Given the following code:

```
static void showOutput(int mark) {
   if (mark == 0) {
      System.out.print("*");
   }
   else {
      System.out.println("[");
      showOutput(mark - 1);
      System.out.print(",");
      showOutput(mark - 1);
      System.out.println("]");
   }
}
```

Can you determine what is produced by the following subroutine calls:
showOutput(0), showOutput(1), showOutput(2), and showOutput(3)?

a.

showOutput(0) outputs: *
showOutput(1) outputs: [*,*]
showOutput(2) outputs: [[*,*],[*,*]]
showOutput(3) outputs: [[[*,*],[*,*]],[[*,*],[*,*]]]

b.

showOutput(0) outputs: [
showOutput(1) outputs: *,*
showOutput(2) outputs: [[],[]]
showOutput(3) outputs: [[[*,*],[*,*]],[[*,*],[*,*]]]

Select one:

- a. ✔
- b.

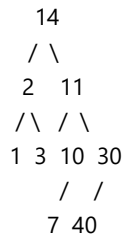
The correct answer is: a.

Question **6**

Correct

Mark 1.00 out of 1.00

Consider the tree below. How many leaves does the tree below have?



Select one:

- a. 2
- b. 4 ✔
- c. 6
- d. 8
- e. 9

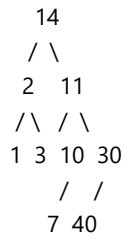
The correct answer is: 4

Question **7**

Correct

Mark 1.00 out of 1.00

What is the value stored in the parent node of the node containing 30?



Select one:

- a. 10
- b. 11 ✔
- c. 14
- d. 40
- e. None of the above

The correct answer is: 11

Question **8**

Correct

Mark 1.00 out of 1.00

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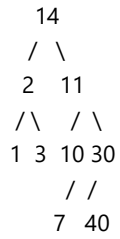


Select one:

- a. 1 2 3 7 10 11 14 30 40
- b. 1 2 3 14 7 10 11 40 30
- c. 1 3 2 7 10 40 30 11 14
- d. 14 2 1 3 11 10 7 30 40 ✔

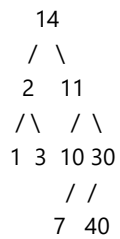
The correct answer is: 14 2 1 3 11 10 7 30 40

Question **9**

Correct

Mark 1.00 out of 1.00

Consider the tree below. What is the order of nodes visited using an in-order traversal?



Select one:

- a. 1 2 3 7 10 11 14 30 40
- b. 1 2 3 14 7 10 11 40 30 ✔
- c. 1 3 2 7 10 40 30 11 14
- d. 14 2 1 3 11 10 7 30 40

The correct answer is: 1 2 3 14 7 10 11 40 30