Unit 6 Practice Test

1. Given the array of integers arr shown below

   | 13 | 7 | 27 | 2 | 18 | 33 | 9 | 11 | 22 | 8 |

what is the output of the following statements?

   ```java
   int[] p = new int[10];
   int[] q = new int[10];
   for (int i = 0; i < 10; i++)
       p[i] = arr[i];
   q = p;
   p[4] = 20;
   System.out.println(arr[4] + " " + q[4]);
   ```

A. 20 20  
B. 18 18  
C. 2 2  
D. 18 20  
E. 2 20

2. Consider the following method:

   ```java
   public static int test(int a, int b) {
       if (a < b)
           return 0;
       else
           return (1 + test(a-b, b));
   }
   ```

What is returned by the call test(15, 4)?

A. 1  
B. 2  
C. 3  
D. 4  
E. 5

3. Which of the following statements about memory management in Java is *not* true?

A. Local variables and method parameters are stored on the stack.  
B. Memory on the heap is allocated dynamically at runtime.  
C. Objects allocated on the heap persist until there are no remaining references to them.  
D. Static memory is used for the instance variables of a class.  
E. The contents of an array can never be stored on the stack.
4. A program for recursive backtracking includes a method similar to this one:

```java
public void key_function(int i) {
    for (int alternative = i; alternative < n; alternative++)
    {
        do_alt(alternative);
        ************
        undo_alt(alternative);
    }
}
```

The line `************` should be replaced by:

A. `do_alt(alternative + 1);`
B. `key_function(alternative);`
C. `key_function(alternative + 1);`
D. `key_function(i);`
E. `key_function(i + 1);`

5. Assume that the following method has been added to the `ArrayBag` class:

```java
public static void changeOneItem(Object newItem) {
    items[0] = newItem;
}
```

Which of the following statements are true?

i. Because the method is static, we would need to use the class name to invoke it from outside the `ArrayBag` class (e.g., `ArrayBag.changeFirst(...)`).
ii. The method will generate an error at compile time.
iii. When the method is invoked, the parameter `newItem` will contain a copy of the object that is passed in as an argument.

A. only i is true
B. only ii is true
C. only iii is true
D. i and ii are true, but iii is not
E. i, ii, and iii are all true
6. Write a recursive method named `sumReciprocals` that takes as its only argument a non-negative integer, `n`, and returns a double value that is the sum of the reciprocals of the integers from 1 to `n`. For example, `sumReciprocals(2)` should return 1.5, which is 1/1 + 1/2, and `sumReciprocals(4)` should return approximately 2.0833, which is 1/1 + 1/2 + 1/3 + 1/4. You do not need to perform any error checking on the value of the parameter. No use of iteration is allowed.

```java
public static double sumReciprocals(int n)
```
7. Write a method for the `ArrayBag` class with the following signature:

```java
public int count(Object item)
```

It should return the number of times that the specified `item` occurs in the `ArrayBag` on which the method is invoked. For example, if `b` is an `ArrayBag` that represents the bag `{5, 7, 2, 10, 7}`, `b.count(7)` should return `2`, `b.count(10)` should return `1`, and `b.count(20)` should return `0`. Your method does not need to use recursion.