1) Suppose the following definitions are in scope:

```java
static int half(int n) {
    return n / 2;
}

static double half(double x) {
    return x / 2.0;
}

static String half(String s) {
    return s.substring(0, s.length()/2);
}
```

What are the values of the following expressions?

- a) `half(7.0)`
- b) `half(7)`
- c) `half("2500")`

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>half(7.0)</code></td>
<td>3.5</td>
</tr>
<tr>
<td><code>half(7)</code></td>
<td>3</td>
</tr>
<tr>
<td><code>half(&quot;2500&quot;)</code></td>
<td>25 or &quot;25&quot;</td>
</tr>
</tbody>
</table>

2) Suppose the following definition is in scope:

```java
static int blowup(int n) {
    if (n > 100)
        return n;
    else
        return blowup(2 * n);
}
```

What is printed by the following code fragment?

```java
int quantity = 10;
System.out.println(blowup(quantity));
```

<table>
<thead>
<tr>
<th>Value</th>
<th>160</th>
</tr>
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</table>

3) Suppose the following definition is in scope:

```java
static String trend(int x, int y) {
    if (x < y) return "Increasing";
    else return "Decreasing";
}
```

What is printed by the following code fragment? (Caution: be careful how you map the arguments onto the method parameters.)

```java
int x = 2, y = 10;
System.out.println(trend(y, x));
```

<table>
<thead>
<tr>
<th>Output</th>
<th>Decreasing</th>
</tr>
</thead>
</table>

Answer Key
4) Two beginning programmers named Bill and Hillary have written static methods named \texttt{triple} and are experimenting with them. In the boxes, write the results of the two experiments. Caution: Since Bill and Hillary are beginning programmers, they may have chosen misleading names for their methods.

a) Bill's experiment:

```java
class BillTest {
    static void triple(int n) {
        n = n * 3;
    }
    public static void main(String[] args) {
        int a = 5;
        triple(a);
        System.out.println(a);
    }
}
```

b) Hillary's experiment:

```java
class HillaryTest {
    static int triple(int n) {
        return n * 3;
    }
    public static void main(String[] args) {
        int a = 5;
        int b = triple(a);
        System.out.println(b);
    }
}
```

5) Suppose the following definitions are in scope:

```java
static int f(int x) {
    return 2 * x;
}
static int g(int x, int y) {
    return x + y;
}
```

What are the values of the following expressions?

a) \(g(3, 4)\)

b) \(f(f(3))\)

c) \(g(f(5), f(2))\)

d) \(f(g(2, 3))\)

e) \(g(1+f(2), 3+f(4))\)
6) Suppose the following definition is in scope:

```java
static int ramp(int n, int p) {
    while (n > 10) {
        --n;
        ++p;
        if (p > n) return p;
    }
    return n;
}
```

What are the values of the following expressions?

a) ramp(15, 12)  
   b) ramp(12, 5)

   14
   10

7) The Fibonacci sequence is a famous sequence of numbers that begins as follows:

0, 1, 1, 2, 3, 5, 8, 13, ...

After the first two numbers, zero and one, each Fibonacci number is the sum of the
previous two Fibonacci numbers.

Write a recursive method fib(n) that returns the nth Fibonacci number. Following the
usual convention, we define fib(0) = 0, fib(1) = 1, fib(2) = 1, fib(3) = 2, fib(4) = 3,
fib(5) = 5, etc. The beginning of the fib(n) method is shown below. For full credit,
your method must be recursive and must work for any non-negative integer n.

```java
static int fib(int n) {
    if (n == 0) return 0;
    else if (n == 1) return 1;
    else return fib(n - 1) + fib(n - 2);
}
```