Multiple Choice Questions (20 points)

Answer all of the following questions. READ EACH QUESTION CAREFULLY. Fill the correct bubble on your scantron sheet. Each correct answer is worth 1 point. Each question has EXACTLY one correct answer.

1. Consider the following method:

```java
public int foo(int[] a, int m){
    int j;
    for(j=0; j<a.length; j++)
        if (a[j]==m) break;
    return j;
}
```

What can you say for sure about foo?

A. foo always returns the index of the array element equal to m
B. foo always returns the length of the array
C. foo must be used with care. It crashes if a is an array of zero length.
D. If m is in the array, foo returns the index of m in the array. If m is not in the array, foo returns the length of the array.
E. At the end of the execution of foo, the array object referred to by a is automatically cleared from the memory by the garbage collector.
2. Consider the following class definition:

```java
public class C{
    public static void foo()
    {
        System.out.println("I am foo in C");
    }
}
```

In some other class, to call the method foo in the C class, you would write:

A. foo();
B. C.foo();
C. new C.foo();
D. A or B
E. B or C

3. In a class definition, you read the following:

```java
public class C{
    public void foo(int n){/*code*/}
    public boolean foo(char c){/*code*/}
    /* more code follows */
}
```

What can you say about the implementations of the foo method?

A. It is an example of method overloading.
B. foo is a static method within the C class
C. It is illegal to use the name foo twice within the class.
D. The return type should be boolean for both implementations of foo.
E. One of the implementations of foo should be private.
4. Consider the following code fragment

```java
Rectangle[][] r = new Rectangle[2][];
r[0] = new Rectangle[3];
r[1] = new Rectangle[4];
```

What is r.length?

A. 0  
B. 2  
C. 3  
D. 4  
E. 14

5. Which is an example of overloading the method that follows?

```java
int parseNumber(String numberString){…}
```

A. `int parseThisNumber(String numberString){…}`  
B. `int parseNumber(String num){…}`  
C. `int parseNumber(String num, String entry){…}`

6. A constructor

A. must have the same name as the class it is declared within.  
B. is used to create objects.  
C. may be overloaded.  
D. B and C  
E. A, B and C
7. Consider

```java
int[][] a = {{1,2},{3,4,5}};
int[] b = a[1];
b[0] = 10;
```

What are the indices i and j of the array element a[i][j] that is equal to 10 after the above code fragment is executed?

A. i=0 j=0  
B. i=0 j=1  
C. i=1 j=0  
D. i=1 j=1  
E. None of the elements of the array a is equal to 10

8. Consider the following table of integers

```
1    1  
1    2    1  
1    3    3    1  
1    4    6    4    1  
1    5    10   10   5    1  
```

Among the following, which array would store the table with the minimum amount of memory used?

A. `int[][] a = new int[5][6];`
B. `int[][] a = new int[5][];  
   for(int i=0; i<a.length; i++) a[i] = new int[i];`
C. `int[][] a = new int[5][];  
   for(int i=0; i<a.length; i++) a[i] = new int[i+1];`
D. `int[][] a = new int[5][];  
   for(int i=0; i<a.length; i++) a[i] = new int[i+2];`
E. `int[][] a = new int[5][];  
   for(int i=0; i<a.length; i++) a[i] = new int[i+3];`
9. Consider the following 2 methods defined in the same class

```java
public void foo(int i, double x){/*version1*/}
public void foo(double x, int i){/*version 2*/}
```

In another method in the same class, the following statement is written

```java
foo(1,2);
```

Which version of `foo` is called?

A. version 1
B. version 2
C. Can't tell. The compiler chooses randomly between version 1 and version 2
D. version 1 is called and then version 2.
E. The code doesn't compile since the call is ambiguous

10. Consider the following method (Hint: try `what(1,1,1)`)

```java
public int what(int a, int b , int c)
{
    if (a<b && a<c) return a;
    if (b<a && b<c) return b;
    if (c<a && c<b) return c;
}
```

What comment can be offered about this method?

A. `what` returns the smallest of the three integers `a`, `b` and `c`
B. `what` always returns the value of `a`
C. `what` always returns the value of `b`
D. `what` always returns the value of `c`
E. The method is incorrect, because it does not always return a value.
11. Consider the following code fragment

    public int mystery(int a, int b)
    {
        if (b==1)
            return a;
        else
            return a + mystery(a,b-1);
    }

What is the value of \texttt{mystery(2,3)}?

A. 2
B. 4
C. 6
D. 8
E. the program generates a run time error (infinite recursion)

12. Still referring to the code fragment of the previous question, what is the value of \texttt{mystery(2,0)}?

A. 2
B. 4
C. 0
D. 1
E. the program generates a run time error (infinite recursion)
13. Consider the code fragment:

```java
int x=2;
int[] a = new int[2];
String s = "Red";
s = foo(x,a,s);
System.out.println("x="+x+" a[0]="+a[0]+" s="+s);

// method foo
public String foo(int i, int[] j, String k)
{
    i= i+1;
    j[0] = j[0]+1;
    k = "Blue";
    return k;
}
```

What is printed?

A. x=2 a[0]=0 s=Red
B. x=3 a[0]=0 s=Red
C. x=2 a[0]=1 s=Red
D. x=3 a[0]=0 s=Blue
E. x=2 a[0]=1 s=Blue.

14. If the instance variables of the Employee class are declared as follows, which of the following statements is most likely to be in the constructor of this class?

```java
private String name;
private Address address;
private long employeeNumber;
```

A. address = 0;
B. address = " ";
C. address = new Address();
D. employeeNumber = "11233444";
E. employeeNumber = 143.144;
15. In which of the following situations would it make most sense to code a static method rather than a regular method in a class that defines a bank account?

A. a method that calculates the number of deposits made in an account  
B. a method that sets the bank account total  
C. a method that changes the annual interest rate for all bank accounts  
D. a method that returns the bank account balance  
E. a method that prints the bank account balance

16. What is the highest index value associated with the array that follows?

```java
int[] values = new int[x];
```

A. 0  
B. x  
C. x + 1  
D. x – 1  
E. can’t tell from information given
17. A method, called `something`, has the following body

```java
{ switch(n) {
    case 1:
        return 0;
    default:
        return 1 + something(n/3);
} }
```

What would be a correct signature for this method body? (correct means that it does not trigger any error or warning message at the compilation).

A. `public int something(int[] n)`  
B. `public double something(int[] n)`  
C. `public int something(int n[])`  
D. `public int something(int n)`  
E. `public void something(int n)`

18. Given the signature that you selected above, what is the value of `something(3*3*3)`?
19. Which of the following is NOT true regarding recursion and iteration?
   A. Any recursive method can be rewritten in an iterative form (with a loop)
   B. Recursive calls take time and consume additional memory
   C. In general, recursive algorithms lead to better performance than iterative algorithms
   D. A recursive method is a method that calls itself
   E. To terminate, a recursive algorithm must have a base case

20. Which of the following is an invalid two-dimensional array definition?
   A. `double[][] values = new double[2][8];`
   B. `double[][] values = new double[8][2];`
   C. `double[][] values = new double[8][];`
   D. `double[][] values = new double[][8];`
   E. `double[][] values = new double[2][0];`