

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:

```
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:

```
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:

```
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

```
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?
- ```
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

```
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

```
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  
**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))

```
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 **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 **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:

```
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?

```
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?
- ```
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

```
{  
    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)** ?

- A. **0**
- B. **1**
- C. **2**
- D. 3**
- E. **4**

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];`