CITS1200 JAVA PROGRAMMING
MULTIPLE CHOICE TEST
SECOND SEMESTER, 2010

Student Name__________________________________________________________

Student Number________________________________________________________

Please write your solutions on the following page provided, filling in the appropriate circle with pencil to indicate your answer. The answer sheet will be automatically read by a scanner, so you must indicate the single answer clearly.

Both the question and answer sheets MUST be returned
1. If \( a \) and \( b \) are defined as follows:

```java
double[] a = {0.1,0.2,0.3};
double[] b = {0.1,0.2,0.3};
```

then what is the value of the expression \( a==b \), and why?

(a) **true** because both arrays have the same type, size and values.

(b) (**false** because they are two different arrays, even though they have identical values.

(c) A runtime error occurs because \( == \) can only be used for primitive types.

(d) We cannot tell because it depends on internal details of the arrays that the client cannot access.

(e) **false** because numerical round-off error means that the floating point numbers cannot be stored exactly.

2. Given the following method (you may assume it has all compiled correctly so there are no syntax errors), what will be output?

```java
public void printloop()
{
    int i;

    for (i=1; i<9; i++)
        if (i%2 == 0)
            System.out.print(i + " ");

    System.out.println();
}
```

(a) (**2 4 6 8
(b) 8
(c) 1 3 5 7
(d) 9
(e) 2 4 6
3. What will be the value of x after the following statement?

    int x = 73/5%3;

    (a) 0
    (b) 1
    (c) (*)2
    (d) 36
    (e) 35

4. What will the method call mystery(1230) return, if the method is defined as follows:

    public int mystery(int n) {
        int m = 0;

        while (n > 0) {
            m = 10*m + n%10;
            n = n/10;
        }

        return m;
    }

    (a) (*)321
    (b) 0
    (c) .123
    (d) .0321
    (e) 0321

5. Consider the following statements.

    BankAccount a = new BankAccount("Tom", 12345, 200);
    BankAccount b = new BankAccount("Tom", 12345, 200);

    What will be the value of a == b and why
(a) **true** because both bank accounts have the same name, number and balance.

(b) The code will not compile because `==` can only be used with primitive types.

(c) **false** because `a` is not equal to `b`.

(d) *(*)**false** because `a` and `b` each refers to a different object.

(e) A runtime error may occur when the balance of the accounts change.

6. Consider the variables declared in the previous question and the statements below.

```java
BankAccount c = a;
c.deposit(50);
a.withdraw(20);
c = b;
c.withdraw(30);
```

What would be the values of `a.getBalance()` and `b.getBalance()`

(a) This will cause a runtime error because object `c` has not been created.

(b) 180 and 200.

(c) 180 and 170.

(d) *(*)230 and 170.

(e) 230 and 220.

7. In the previous question how many objects of type `BankAccount` have been created?

(a) none
(b) 1
(c) *(*)2
(d) 3
(e) 4
8. What is the value of the expression

\[ 10 + 5 \times 4 / 6 - 13 \% 3 \]

(a) 16  
(b) 15.66666666667  
(c) 15  
(d) 12.66666666667  
(e) (*)12

9. What are the respective values of the following three expressions?

1. \((\text{double}) (4 \times 7 / 2)\)
2. \(4 \times (\text{double}) (7 / 2)\)
3. \(4 \times 7 / (\text{double}) (2)\)

(a) (*)14.0, 12.0 and 14.0  
(b) 14.0, 6.0 and 12.0  
(c) 14.0, 14.0 and 14.0  
(d) 12, 14.0, 12.0  
(e) 14, 14 and 14

10. Consider the following variable declaration

```java
BankAccount b;
```

This declaration

(a) will cause a syntax error, as it is not permitted to declare a variable of reference type without constructing the associated object.  
(b) has created a variable called `b` with the initial value `0`.  
(c) creates a `BankAccount` object called `b`.  
(d) creates an object only if the class has a no-argument constructor, otherwise causes a runtime error.  
(e) (*)creates a variable called `b` with the initial value `null`.  

11. The statement following the declaration in the previous question is

\[ b = \textbf{new} \ \text{BankAccount}("Steve Jobs", 890, 300) ; \]

This statement

(a) will cause a syntax error, because it is not possible to have a no-argument constructor in Java.
(b) cannot create the object \( b \) because it is already \textbf{null}.
(c) (*) creates space for the BankAccount object and assigns the reference value to \( b \).
(d) will fail to compile because a ; is not expected in this statement.
(e) cause a run-time error because the object \( b \) has already been declared.

12. What does the method call \( \text{fib}(7) \) return if \( \text{fib} \) is defined as follows?

\[
\text{public int fib(int n) \{}
\]

\[
\text{int[]} \ a = \text{new int}[n];
\]

\[
a[0] = 1;
\]

\[
a[1] = 1;
\]

\[
\text{for (int i=2; i<n; i++) \{}
\]

\[
a[i] = a[i-1] + a[i-2];
\]

\[
\}
\]

\[
\text{return a[n-1];}
\]

\[
\}
\]

(a) 6
(b) 8
(c) (*) 13
(d) 21
(e) 55
13. Which of the following is a true statement about constructors?

(a) A class can have only one constructor.
(b) A constructor cannot have any parameters.
(c) A constructor can return a primitive type.
(d) A constructor cannot call an instance method.
(e) None of the above statements about constructors are true.

14. If \(a\) and \(b\) are variables of type boolean then which of the following expressions is true when exactly one of \(a\) and \(b\) is true, and false under all other circumstances?

(a) \(a \lor b\)
(b) \(a \land b\)
(c) \((a \land \neg b) \land (\neg a \land b)\)
(d) \((a \lor b) \land (\neg a \lor \neg b)\)
(e) \((a \lor b) \lor (\neg a \lor \neg b)\)

15. What is the output of \(\text{loop}(8)\), where \(\text{loop}\) is defined as follows?

```java
public void loop(int n) {
    for (int i=0; i<n; i++) {
        System.out.print(i*(i-1)/2);
        System.out.print(" ");
    }
    System.out.println();
}
```

(a) 0 0 3 4 10 12 21
(b) 0 1 3 6 10 15 21 28
(c) None of the above
(d) 0 3 4 10 12 21 24 36
(e) 0 0 3 4 10 12 21 24
16. Which of the following methods will correctly calculate the maximum value in an array? All of these methods compile correctly, so you are only looking for logic errors, not syntax errors. (The method Math.max() is a library method from the Java API and returns the maximum of its two arguments.)

```java
public int max1(int[] a) {
    int maxPos = 0;
    for (int i=1; i<a.length; i++) {
        if (a[i] > a[maxPos]) {
            maxPos = i;
        }
    }
    return maxPos;
}
```

```java
public int max2(int[] a) {
    int max = a[0];
    for (int i=0; i<a.length; i++) {
        if (a[i] > max) {
            max = a[i];
        }
    }
    return max;
}
```

```java
public int max3(int[] a) {
    for (int i=1; i<a.length; i++) {
        a[i] = Math.max(a[i], a[i-1]);
    }
    return a[a.length-1];
}
```

(a) max1 and max2 only  
(b) max1 and max3 only  
(c) (*max2 and max3 only  
(d) None of them  
(e) All of them
The next two questions refer to the following code.

```java
public class EtchAsketch {
    private SimpleCanvas sc;
    private int xPos;
    private int yPos;
    private int width;
    private int height;

    public EtchAsketch() {
        SimpleCanvas sc = new SimpleCanvas();
        xPos = 200;
        yPos = 200;
        width = 400;
        height = 400;
    }

    public EtchAsketch(int width, int height) {
        this.width = width;
        this.height = height;
        sc = new SimpleCanvas("Etcher", width, height);
        xPos = width/2;
        yPos = height/2;
    }

    public void up(int distance) {
        sc.drawLine(xPos, yPos, xPos, yPos-distance);
        yPos = yPos - distance;
    }
}
```

17. How many attributes, constructors and methods does EtchAsketch have?

(a) 4, 1 and 2.
(b) (*) 5, 2 and 1.
(c) 5, 1, and 2.
(d) 4, 2 and 1.
(e) 5, 3 and 0.
18. When `EtchAsketch ek = new EtchAsketch();` is executed

(a) It causes an error because `width` and `height` values are not passed to the constructor.
(b) It initializes all instance variables except `sc`.
(c) It causes a runtime error.
(d) It creates the variable `sc`, an `EtchAsketch` object, and assigns the object reference to `sc`.
(e) (*) Both (b) and (d) are correct.

19. Suppose that the class `Drawer` contains an instance variable `sc` which refers to a `SimpleCanvas`, and that it has the following method:

```java
public void mystery() {
    java.awt.Color col1 = new java.awt.Color(0,255,0); // Green
    java.awt.Color col2 = new java.awt.Color(255,255,0); // Yellow
    for (int i = 0; i < 400; i++) {
        sc.setForegroundColour(col1);
        if (i > 100 && i < 300) sc.setForegroundColour(col2);
        sc.drawLine(i,0,i,400);
    }
}
```

If you call this method when the `SimpleCanvas sc` is blank, visible and has size 400 × 400, then what will appear on the screen?

(a) (*) A thick yellow stripe going top to bottom on a green background.
(b) A yellow square centred in a green background.
(c) A thick yellow stripe going left-to-right on a green background.
(d) A green square centred in a yellow background.
(e) A blue square centred in a yellow background.
20. Consider the following class with a single method

```java
public class Doubler {
    public void doubleIt(int n) {
        n = 2*n;
    }

    public void doubleIt(int[] n) {
        n[n.length-1] = 2*n[n.length-1];
    }
}
```

What happens when the class is compiled, and the following sequence of statements (which is part of a method of another class) is compiled and executed?

```java
int x = 20;
int[] y = {1, 5, 10};
Doubler d = new Doubler();
d.doubleIt(x);
d.doubleIt(y);
System.out.println(x + " " + y[y.length-1]);
```

(a) The values 40 10 will be printed to the terminal window.
(b) (*)& The values 20 20 will be printed to the terminal window.
(c) The values 40 20 will be printed to the terminal window.
(d) The values 20 10 will be printed to the terminal window.
(e) The values 20 2 10 20 will be printed to the terminal window.