Week 5 Tutorial

Programming Basics

1. Write the definition of a method that squares a number and can be called in the following way:

   ```java
   int result = square(5);
   ```

2. Why is it important for a programming language to support conditional tests?

3. Write boolean expressions for the following:
   - x is less than 10
   - x equals y
   - x is greater than or equal to 0 and less than 10
   - x is greater than or equal to 0, less than 20 but not equal to y
   - x is exactly divisible by 4
   - x is less than 0 or x is greater than 0
   - x is less than y or y < 50

4. Indent the following statements properly: [Wu Chap 5, Ex. 1]

   a. if (a == b) if (c == d) a = 1; else b = 1; else c = 1;

   b. if (a == b) a = 1; if (c == d) b = 1; else c = 1;

   c. if (a == b) {if (c == d) a = 1; b = 2; } else b = 1;

   d. if (a == b) {
      if (c == d) a = 1; b = 2; }
      else {b = 1; if (a == d) d = 3; }
      else c = 1;

5. Which two of the following three statements are equivalent? [Wu Chap 5, Ex. 2]

   o if (a == b)
     if (c == d) a = 1;
     else b = 1;

   o if (a == b) {
     if (c == d) a = 1; }
     else b = 1;

   o if (a == b)
     if (c == d) a = 1;
     else b = 1;

6. Consider the following code:

   ```java
   System.out.println("1 : Apple, 2 : Orange, 3 : Irn-Bru");
   int menu_choice = EasyIn.getInt();
   switch (menu_choice) {
   case 1 : {
     System.out.print("You chose Apple juice");
     break;
   }
   case 2 : {
     System.out.print("You chose Orange juice");
     break;
   }
   case 3 : {
     System.out.print("You chose Irn-Bru");
     break;
   }
   ```
default : {
    System.out.println("Your choice was invalid");
    break;
}
}

What would be the consequence of omitting the default case of the switch statement?

7. Describe and explain the result of running the following program:

```java
public class Q8 {
    public static int q8(int i, int j) {
        int x = 0;
        int y = 3;
        int z = -2;
        int k = i - j;
        if (k > y) z = x + 2;
        if (z < 0 || j > x) {
            y++;
            z++;
        } else {
            x--;
            i += 3;
        }
        return i + j + x + y;
    }
    public static void main(String[] args) {
        int result = q8(5, 3);
        System.out.println("result: "+ result);
    }
}
```

8. What does the following program calculate? (try it!)

```java
public void mystery(int y, int m, int d) {
    int a=0;
    int b=0;
    int c=0;
    if (m < 3){
        a = m + 10;
        b = (y-1)%100;
        c = (y-1)/100;
    } else{
        a = m - 2;
        b = y%100;
        c = y/100;
    }
    int w = (700 + (((26*a)-2)/10)+d+b+b/4+c/4-(2*c))%7;
    System.out.println(w);
}
```

Exam Style Multiple Choice Questions

9. Which one of the following statements is true?
   A. The arithmetic addition operator has higher precedence than the arithmetic multiplication operator.
   B. The Boolean AND operator && has higher precedence than the Boolean OR operator ||.
   C. The assignment operator has higher precedence than relational operators.
   D. The assignment operator has higher precedence than the arithmetic operators.
   E. The arithmetic operators have lower precedence than the Boolean operators.

10. Consider the following fragment of code:
    ```java
        int x, y, z;
    ```
// some code here which gives values to x y and z
if (y <= z) x = 10;
else x = 20;

Which one of the following statements is true?

A. The if statement above is one way to make x get the value 20 when y has a smaller value than z, and 10 otherwise.
B. The if statement above is one way to make x get the value 10 when y has a larger value than z, and 20 otherwise.
C. The if statement above is unnecessary, and should be replaced by a single assignment.
D. The if statement above is one way to make x get the value 20 when z has a larger value than y, and 10 otherwise.
E. The if statement above is one way to make x get the value 20 when y has a smaller value than z, and 10 otherwise.

11. What is the output from the following program?

    public class Q11 {
        public static void main(String[] args) {
            int x = 1;
            int y = 2;
            if (x > 1 || y < 2) {
                if (x <= 1 && y >= 2) x++;
                else x--;
            }
            System.out.println("x: " + x);
        }
    }

    A. x: -1
    B. x: 0
    C. x: 1
    D. x: 2
    E. x: 3