CS1010J Programming Methodology
Tutorial 2: Selection Statements

> Learn as much as you can while you are young, since life becomes too busy later.
> ~ *Dana Stewart Scott*

To students:

Please be reminded that the submission deadline of **Problem Set 1** is **this Saturday 6pm.** Please submit at least 10 exercises (including the compulsory one) before the deadline and you can continue working on the rest after that.

Take note that copy and paste of programs for submission of Problem Sets is considered plagiarism and offenders will be subject to the disciplinary action of the school.

I. Manual tracing

1. If the data type of the actual parameter passed to a method does not match the data type of the formal parameter, data type conversion (promotion) will occur automatically. The effect is similar to the data type conversion in assignment statement.

   Study the following program.

```
class T2Q1 {

  public static void main(String[] args) {

    double result1 = add(4, 5);

    //double result2 = add(4.7, 5.2);  // part (b)

    System.out.println(result1);
  }

  public static double add(double x, int y) {
    return x + y;
  }
}
```

   (a) What is the output of the above program?

   (b) What if we uncomment the line marked with the comment **// part (b)**?

2. Rewrite the following **switch** statement using **if-else** statements.

```
switch (grade) {
  case 10: case 9:
    a = 1;
    b = 2;
    break;
  case 8:
    a = 3;
    b = 4;
    break;
  default:
    a = 5;
    b = 0;
    break;
}
```

3. Given three integers, we are supposed to find the maximum value among them.

   (a) Student Adam wrote the following code fragment for the task.

```
// suppose num1, num2 and num3 are given by the user

int max = 0;
if (num1 > num2 && num1 > num3) {
  max = num1;
}
if (num2 > num1 && num2 > num3) {
  max = num2;
}
if (num3 > num1 && num3 > num2) {
  max = num3;
}
System.out.println("Maximum value = " + max);
```

   Does the above code fragment work? If your answer is no, give a counter example (i.e. give three integers such that the above code fails to derive the correct answer).

(b) Student Brusco on the other hand, wrote the following code fragment.

```
// suppose num1, num2 and num3 are given by the user

int max = num1;
if (num2 > max) {
  max = num2;
} else {
  max = num3;
}
System.out.println("Maximum value = " + max);
```

Does the above code fragment work? If your answer is no, give a counter example.

(c) Student Richard wrote the following code fragment.

```
// suppose num1, num2 and num3 are given by the user

int max = 0;
if (num1 > max) {
  max = num1;
}
if (num2 > max) {
  max = num2;
}
if (num3 > max) {
  max = num3;
}
System.out.println("Maximum value = " + max);
```

Does the above code fragment work? If your answer is no, give a counter example.

(d) Give a correct code fragment that finds the maximum among 3 integer values.

4. **Conditional operator** **?** **:** is sometimes used in place of the 'if-else' statement wherever appropriate. Study the method **`test1()`** below for an example.

```
public static void test1() {

  Scanner sc = new Scanner(System.in);

  System.out.print("Enter an integer: ");
  int n = sc.nextInt();

  int p = ((n > 5) && (n < 20)) ? 33 : -77;

  System.out.println("p = " + p);
}
```

Do you know how to use the conditional operator now? Try to replace the 'if-else' statement in the following method **`test2()`** with the conditional operator.

```
public static void test2() {

  Scanner sc = new Scanner(System.in);

  System.out.print("Enter 2 integers: ");
  int a = sc.nextInt();
  int b = sc.nextInt();

  int max;

  if (a > b) {
    max = a;
  } else {
    max = b;
  }

  System.out.println("max = " + max);
}
```

Replace the **if-else** statement in the box with the conditional operator.

II. Programming

5. The following program works but is not nicely written. Improve it by simplifying the logic and avoiding re-computation.

```
import java.util.*;

class T2Q5 {

  public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    System.out.print("Enter two values: ");
    double num1 = sc.nextDouble();
    double num2 = sc.nextDouble();

    if (num1/num2 < 90.2) {
      if (num1/num2 < 32.2) {
        System.out.println("Paper");
      } else if (num1/num2 >= 45.8) {
        System.out.println("Ruler");
      } else {
        System.out.println("Pencil");
      }
    } else {
      if (num1/num2 >= 100.0) {
        System.out.println("Unknown");
      } else if (num1/num2 < 100.0) {
        System.out.println("Eraser");
      } else {
        System.out.println("Clip");
      }
    }
  }  // end main
}
```

Logic should be neat and clear.

6. **[Problem Set 1 Exercise #21]** Body Mass Index