ISD Week 2 Lab

A. Writing some more programs.

1. Write a program that prompts the user to enter an integer between 0 and 100, representing the mark gained by a student in an exam, and outputs a corresponding letter grade. A mark of 70 and over corresponds to an "A" grade; a mark of 60 to 69 to a "B" grade; a mark of 50 to 59 to "C"; a mark of 40 to 49 to "D"; and a mark of 39 and lower to "Fail".

2. Write a program that prompts the user to enter a floating point number representing a wavelength in the electromagnetic spectrum, and outputs whether that wavelength falls in the Radio waves, Microwaves, Infrared, Visible light, Ultraviolet, X-ray, or Gamma ray part of the spectrum. Include and use the following constant declarations in your program:

```
final double RADIO_WAVE_THRESHOLD = 1E-1;
final double MICROWAVE_THRESHOLD = 1E-3;
final double INFRARED_THRESHOLD = 7E-7;
final double VISIBLE_LIGHT_THRESHOLD = 4E-7;
final double ULTRAVIOLET_THRESHOLD = 1E-8;
final double X_RAYS_THRESHOLD = 1E-11;
```

   (Radio waves have a wavelength greater than or equal to the RADIO_WAVE_THRESHOLD shown above, Microwaves have a wavelength less than the RADIO_WAVE_THRESHOLD and greater than or equal to the MICROWAVE_THRESHOLD; and so on; Gamma rays have a wavelength that is less than the X_RAYS_THRESHOLD.) Test your program with a range of different inputs, falling into each of these parts of the spectrum.

3. Write a program that prompts the user to enter a floating point number representing a temperature value, and then also to enter C or F to indicate whether this temperature is expressed in Centigrade or in Farenheit. The program should print whether water is a liquid, solid or gas at this temperature (water freezes at 0 degrees Centigrade/32 degrees Farenheit and it boils at 100 degrees Centigrade/212 degrees Farenheit). Hint: Use a nested if statement.

4. Write a program that prompts the user to enter three floating point numbers and prints out the largest of them.

5. Write a program that asks the user to enter two floating point numbers and outputs whether their difference is less than 0.01. Use a single `if` statement and the `Math.abs` method.

   (Note the difference between methods such as Math.pow and Math.abs, which are invoked using the name of the class in which they are defined; and methods such as print, println,

next etc., which are invoked using an object name. These two different kinds of methods are called *static* methods and *instance* methods in Java, respectively, and we will be exploring them in detail in an upcoming lecture.)

6. Write a program that asks the user to input an integer, representing a year, and outputs whether this is a Leap year. Leap years are those that are divisible by 4. However, years that are divisible by 100 are not leap years, unless they are also divisible by 400. Use a single `if` statement and the Boolean operators && and ||

7. Write a program that prompts the user to enter three strings and prints them out in ascending lexicographic order.

B. Improving our programs from Week 1

Revisit some of your programs from last week and edit them so as to improve the way they print their output:

For programs C1 and C5, use **System.out.printf** and write the output with two decimal places.

For program C2, use **System.out.printf** to write out floating point number outputs to two decimal places, and also align the three outputs one under the other e.g.

Square: xxxxxxxxxx.xx
Cube: xxxxxxxxxx.xx
Fourth power: xxxxxxxxxx.xx

Improve program C4 similarly.

For program C3, use **System.out.printf** to write out decimal or floating point number outputs, similarly aligned.