**Programming and Data Structures Laboratory, 2018-19 Spring semester, Section 6**

**January 22, 2019: Tutorial and Assignment 2 (Branch control structures)**

**Tutorial 2 (for practice – write in a notebook)**

1. (Derivative of polynomials) This is the same problem as was given in Assignment 1. In this problem, you will compute the derivative of a degree 5 polynomial of a single variable. Assume that its coefficients are integers. Take in the 6 coefficients as inputs from the keyboard. Print the polynomial, and then compute and print the derivative polynomial. Find a sample input and output below; stick to the format shown below.

Enter coefficient of 1: 5

Enter coefficient of x: 2

Enter coefficient of x^2: -2

Enter coefficient of x^3: 7

Enter coefficient of x^4: 0

Enter coefficient of x^5:3

Polynomial: 3*x^5 + 7*x^3 - 2*x^2 + 2*x + 5

Derivative: 15*x^4 + 21*x^2 - 4*x + 2

Note that, while displaying the polynomial and its derivative, the signs '+' or '-' must be shown correctly depending on the coefficient following the sign, and a term having zero coefficient should not be displayed.

**Assignment 2 (for evaluation – write on machine and submit to Moodle before end of class)**

1. [10 marks] Consider a square of side length L and a circle of radius R, where L and R are user-inputs. Determine whether the square can be placed inside the circle, or the circle can be placed inside the square, or none can be placed inside the other. You can assume L and R to be integers. Assume that both the square and the circle will be centred at (0,0).

2. [15 marks] Write a program that takes an integer number between 1 and 100 as input, and then prints the value of the input in words. Some sample inputs and outputs are:
Input: 13
Output: Thirteen
Input: 56
Output: Fifty six
Input: 98
Output: Ninety eight
Note that, a brute force method is to write 100 if-else conditionals. But this problem can be solved using far less number of conditionals, by utilizing the fact that the word representations of numbers between 20 and 99 follow a pattern.

3. [15 marks] Take coordinates of four points on the 2d plane as input through keyboard. Each point is represented by a pair of integer coordinates, e.g. (4,-5). Write a program to determine whether there is a rectangle with these four points as its vertices. Note that the sides of the rectangle do not have to be parallel to the coordinate axes. eg. there is a rectangle whose vertices are (0,0), (1,2), (-1,3), (-2,1).

Submission instructions:

Submit one compressed file, named as **<roll number>_A2.tar.gz** or **<roll number>_A2.zip**

The compressed file should contain three source files:

**<roll number>_A2_1.c, <roll number>_A2_2.c, <roll number>_A2_3.c**