Section 16

PDS Lab **Lab-3** **01.09.2023**

Instructions:

- This lab is based on the topics: Branching and Conditionals.
- You should save each program with the file name as specified against each problem as <Lab#>_<Assignment#>_<Roll#>.c. For example, **03_01_23CS10006.c** to save Program to 1st assignment in Lab 3 with Roll Number 23CS10006
- You should upload each program to the Moodle system. Also, copy+paste your programs to the text window on the test page.
- There will be no evaluation and hence grade, if you don't submit your .c files to the Moodle server. Use **emacs** editor and **gcc command** in terminal to run the following programs.
- Document your programs meaningfully using appropriately named variable and sufficient amount of comments. Documentation and proper code indentation carry marks.
- **The top two lines of your programs must contain the following information:**

  //Roll No.: <Type in your roll no.>

  //Name: <Type in your name>

1. Assume that a class has 5 students. Read the Roll number (integer) and Marks out of (100) for the 5 students and display the data nicely formatted.

Example:

Enter details for student 1:

1001 75 35 95 50 99

Enter details for student 2:

2435 50 45 99 80 83

Enter details for student 3:

1023 75 55 89 77 56

Enter details for student 4:

2132 88 77 98 78 64

Enter details for student 5:

3152 54 20 21 86 55

Tabular Display:

1001	75	35	95	50	99
2435	50	45	99	80	83
1023	75	55	89	77	56
2132	88	77	98	78	64
3152	54	20	21	86	55

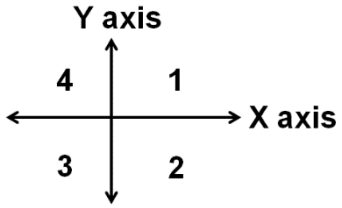
Note: Use of Loops and Arrays anywhere in your program will attract 50% penalty

2. Read the total mark (Integer) of a student in a subject out of 100. Display his/her grade in the subject. **Use the following Marks to Grade conversion table:**

Mark>=90 Grade=EX
Mark>=80 Grade=A
Mark>=70 Grade=B
Mark>=60 Grade=C
Mark>=50 Grade=D
Mark>=35 Grade=P,
Mark<35 Grade=F

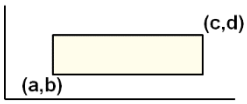
Note: Use of Loops and Arrays anywhere in your program will attract 50% penalty

3. Read a pair of integers representing the x and y coordinates of a point **p** and display a message telling if the point **p** lies either on the x-axis or the y-axis (or both). If it neither lies on x axis nor on y axis, then display a message telling in which quadrant it lies (the quadrants are numbered as shown below).



Note: Use of Loops and Arrays anywhere in your program will attract 50% penalty

4. A rectangle with sides parallel to the X and Y-axes can be fully specified by specifying the (x,y) coordinates of the bottom-left corner and the top-right corner as shown below:



Your program should do the following:

I. Read four integer values representing the coordinates (a, b) and (c, d) --- the bottom-left and top-right corners of the rectangle. First, check if the rectangle is well-formed, that is, if (c,d) really lies to the right of and above of (a,b) or not. If not, display "Ill formed rectangle" and exit the program.

II. Read a pair of integers x and y representing a point **p**=(x,y). Check if the point **p** lies inside the rectangle, outside the rectangle, or only on one of the sides of the rectangle (left, right, top, or bottom side), or on two of the sides (that is, on any corner of the rectangle). Display an appropriate message.

Example: If (a=0, b=0) (c=100,d=100), then if (**p** =50,100), your display should be "**p** = (50,100) lies on the top side of the rectangle. If **p** =(x=100, and y=100), then your display should be "**p** =(100,100) lies on the top right corner of the rectangle. If **p** = (x=210,y=50), you should display "**p** = (210,50) lies outside the rectangle"

Note: a,b,c,d,x,y are all integers (i.e., positive, zero, or negative)

Note: Use of Loops and Arrays anywhere in your program will attract 50% penalty

5. Write a program to compute the derivative of a degree 5 polynomial of a single variable of the form $ax^5+bx^4+cx^3+dx^2+ex+f$. Assume that all the coefficients are positive integers. Read 6 coefficients (a,b,c,d,e,f) as inputs from the keyboard. Display the polynomial, and then compute and display the first derivative of the polynomial. A sample input and output are given below; stick to the format shown below.

Enter coefficient of x^0: 5

Enter coefficient of x^1: 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 + 0*x^4+7*x^3 + 2*x^2 + 2*x + 5

Derivative: 15*x^4 + 0*x^3+ 21*x^2 + 4*x + 2

Note: Use of Loops and Arrays anywhere in your program will attract 50% penalty