

PDS LAB [Date: 13th Aug 2024]

Assignment - 1 [Datatypes, Variables, Operators, Expressions and I/O]

Instructions:

1. Create a directory named as *RollNoAsgn1*.
 2. Give the name of the program as <p>.c where <p> implies the problem number, like 1.c, 2.c, 3.c, etc. Store all the programs of this week under this directory.
 3. Zip the folder *RollNoAsgn1* and upload the *RollNoAsgn1.zip* file to the Moodle course web page latest by 5.00 PM (without penalty). The cutoff time will be till 5.15 PM with a penalty of 25% on your secured marks (i.e., if you secured 80 marks, after penalty you will get 60 marks). Beyond 5.15 PM, the moodle system will not allow you to submit, as a result you will get zero.
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p1] Write a C program to find the perimeter and squared area of a triangle. The corners of a triangle [A(x1, y1), B(x2, y2) and C(x3, y3)] should be provided by the user through keyboard. Use appropriate prompts to the user for passing the inputs from the keyboard and display the output. **[25 marks]**

Perimeter of a triangle = AB+BC+CA, where AB, BC and CA are the lengths of sides of triangle.

Squared area = $S(S-AB)(S-BC)(S-CA)$, where $S = \text{Perimeter}/2$

p2] Swap 2 numbers: **[25 marks]**

Write a C program to swap two given numbers. You need to assign the input numbers (from the keyboard) to two variables "x" and "y". You need to perform the swapping of the values associated to the variables and print the variables before and after swapping.

a] using 1 extra variable.

b] without using any extra variable.

p3] Write a program in C that performs the following tasks: **[25 marks]**

1. Read a floating-point number x and an integer n from the user.
2. Compute and print the following:
 - o **Ceiling** of x: The smallest integer greater than or equal to x.

- o **Floor** of x: The largest integer less than or equal to x.
 - o **Result** of dividing x by n as a floating-point number.
 - o **Result** of dividing x by n and casting the result to an integer.
 - o **Result** of dividing n by x as a floating-point number.
 - o **Result** of dividing n by x and casting the result to an integer.
3. Print all floating-point results up to 2 decimal places, to do this you can use:
`printf("%.2f", floating_point_value);`
- `Include<math.h>` [while compiling: `gcc 3.c -o 3.out -lm`]
 - To find ceil of x use: `ceil(x)`
 - To find floor of x use: `floor(x)`
 - To convert a floating-point number to an integer, use the int type cast:
`int intValue = (int)x; // Casts float x to int.`
 - To convert an integer to a floating-point number, use the float type cast:
`float floatValue = (float)n; // Casts int n to float`

Example:

Enter a floating-point number (x): 8.75 Enter an integer (n): 4

Output explanation:

1. Ceiling of x:

- o The smallest integer greater than or equal to 8.75 is 9.
- o **Result:** 9.00

2. Floor of x:

- o The largest integer less than or equal to 8.75 is 8.
- o **Result:** 8.00

3. Result of dividing x by n (as float):

- o 8.75 divided by 4 equals 2.1875. When printed with 2 decimal places, it is 2.19.
- o **Result:** 2.19

4. Result of dividing x by n (as int):

- o 8.75 divided by 4 equals 2.1875. Casting this to an integer gives 2 (fractional part is discarded).
- o **Result:** 2

5. Result of dividing n by x (as float):

- o 4 divided by 8.75 equals approximately 0.457. When printed with 2 decimal places, it is 0.46.
- o **Result:** 0.46

6. Result of dividing n by x (as int):

- o 4 divided by 8.75 equals approximately 0.457. Casting this to an integer gives 0 (fractional part is discarded). Hence result = 0.
- o **Result:** 0

p4] In this problem, you need to compute the derivative of a degree-5 polynomial of one variable x : $a_5 x^5 + a_4 x^4 + a_3 x^3 + a_2 x^2 + a_1 x + a_0$ **[25 marks]**

Assume that the coefficients a_i of the polynomial are integers. Input the 6 coefficients from the user. Print the polynomial, and then compute and print the derivative polynomial.

A sample input and output are given; your program should follow the format shown below.

Enter the constant term: 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: $3x^5 + 0x^4 + 7x^3 - 2x^2 + 2x + 5$

Derivative: $15x^4 + 0x^3 + 21x^2 - 4x + 2$

Note that some of the coefficients can be zero. Ideally, terms with zero coefficients should not be printed while printing the polynomials. You will learn later how to print a certain term conditionally, i.e., print a term only if the coefficient is non-zero. For the purpose of this assignment, you can print out all terms including those with zero coefficients
