Module 3: Deep Dive - Functions, OOPs, Modules, Errors, and Exceptions

Case Study – 1

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1. A Robot moves in a Plane starting from the origin point (0,0). The robot can move UP, DOWN, LEFT, or RIGHT. The trace of Robot movement is as given following:
   UP 5
   DOWN 3
   LEFT 3
   RIGHT 2
   The numbers after directions are steps. Write a program to compute the distance current position after a sequence of movements.

   Hint: Use the math module.

2. Data of XYZ company is stored in the sorted list. Write a program for searching specific data from that list.

   Hint: Use if/elif to deal with conditions.

3. Weather forecasting organization wants to show whether is it day or night. So, write a program for such an organization to find whether is it dark outside or not.

   Hint: Use the time module.

4. Write a program to find the distance between two locations when their latitude and longitudes are given.

   Hint: Use the math module.

5. Design software for bank systems. There should be options like cash withdrawal, cash credit, and a change password. According to user input, the software should provide the required output.

   Hint: Use if else statements and functions.

6. Write a program that will find all such numbers which are divisible by 7 but are not a multiple of 5, between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line.

7. Write a program that can compute the factorial of a given numb. Use recursion to find it.
   Hint: Suppose the following input is supplied to the program: 8

   Then, the output should be:

   40320

8. Write a program that calculates and prints the value according to the given formula:
   Q = Square root of [(2 * C * D)/H]
   Following are the fixed values of C and H: C is 50. H is 30.
   D is the variable whose values should be input to your program in a comma-separated sequence.

   Example:

   Let us assume the following comma-separated input sequence is given to the program:
   100,150,180
   The output of the program should be:
   18,22,24

9. Write a program that takes 2 digits, X, Y as input and generates a 2-dimensional array. The element value in the i-th row and j-th column of the array should be i*j.
   Note: i=0,1.., X-1; j=0,1,¡-Y-1.

   Example:
   Suppose the following inputs are given to the program:
   3,5
   Then, the output of the program should be:
   [[0, 0, 0, 0, 0], [0, 1, 2, 3, 4], [0, 2, 4, 6, 8]]

10. Write a program that accepts a comma-separated sequence of words as input and prints the words in a comma-separated sequence after sorting them alphabetically.

    Suppose the following input is supplied to the program:

without,hello,bag,world

Then, the output should be:

bag,hello,without,world

11. Write a program that accepts sequence of lines as input and prints the lines after making all characters in the sentence capitalized.
Suppose the following input is supplied to the program:

Hello world

Practice makes perfect

Then, the output should be:

HELLO WORLD

PRACTICE MAKES PERFECT

12. Write a program that accepts a sequence of whitespace-separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.
Suppose the following input is supplied to the program:

hello world and practice makes perfect and hello world again

Then, the output should be:

again and hello makes perfect practice world

13. Write a program that accepts a sequence of comma separated 4 digit binary numbers as its input and then check whether they are divisible by 5 or not. The numbers that are divisible by 5 are to be printed in a comma-separated sequence.

Example:

0100,0011,1010,1001

Then the output should be:

1010

14. Write a program that accepts a sentence and calculates the number of upper case letters and lower case letters.

    Suppose the following input is supplied to the program:

    Hello world!

    Then, the output should be:

    UPPER CASE 1

    LOWER CASE 9

15. Give an example of the fsum and sum function of the math library.