Navrachana University, Vadodara

Improvement Sessions: 7th June, 2024 to 27th June, 2024

PSPY (Problem Solving using Python) Assignments

1. (a) Write a Python program that reads a given expression and evaluates it.
Terms and conditions:
The expression consists of numerical values, operators and parentheses, and it ends with '='.
The operators includes +, -, *, / which represent, addition, subtraction, multiplication and division, respectively.
When two operators have the same precedence, they are applied from left to right.
You may assume that there is no division by zero.
All calculation are to be performed as integers. So, the decimal part should be truncated. Length of the expression will not exceed 100.
-1 ? 10 9 = intermediate results of computation = 10 9

(b) Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are the square of the keys.
Sample Dictionary
{1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81, 10: 100, 11: 121, 12: 144, 13: 169, 14: 196, 15: 225}

2. (a) Write a Python program to create a dictionary from a string. Key is the alphabet, and value is the count of the alphabetin the string.
Example string : 'ankita'
Expected output: {'a': 2, 'n': 1, 'k': 1, 'i': 1, 't': 1}

(b) Write a Python program to find string similarity between two given strings.
Sample Output:
Original string:
Python Exercises
Python Exercises
Similarity between two said strings:
1.0
Original string:
Python Exercises
Python Exercise
Similarity between two said strings:
0.967741935483871
Original string:
Python Exercises
Python Ex.
Similarity between two said strings:
0.6923076923076923
Original string:
Python Exercises
Python
Similarity between two said strings:

0.5454545454545454
Original string:
Java Exercises
Python
Similarity between two said strings:
0.0

3. Write a Python program to check the sum of three elements (each from an array) from three arrays is equal to a target value. Print all those three-element combinations.
Sample data:
```
/*
X = [10, 20, 20, 20]
Y = [10, 20, 30, 40]
Z = [10, 30, 40, 20]
target = 70
*/
```

4. Write a Python function to check whether a number is "Perfect" or not.
According to Wikipedia : In number theory, a perfect number is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself (also known as its aliquot sum). Equivalently, a perfect number is a number that is half the sum of all of its positive divisors (including itself).
Example : The first perfect number is 6, because 1, 2, and 3 are its proper positive divisors, and 1 + 2 + 3 = 6. Equivalently, the number 6 is equal to half the sum of all its positive divisors: (1 + 2 + 3 + 6) / 2 = 6. The next perfect number is 28 = 1 + 2 + 4 + 7 + 14.

5. Write a Python function that prints the first n rows of Pascal's triangle.
Note : Pascal's triangle is an arithmetic and geometric figure first imagined by Blaise Pascal.
Sample Pascal's triangle :
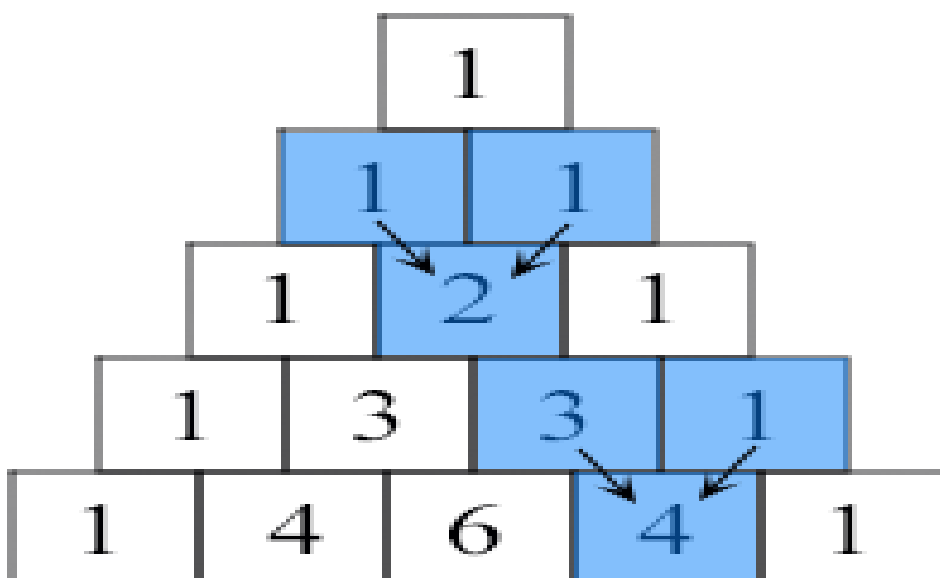
After starting with 1, subsequent numbers are derived by adding the two neighboring numbers in the previous row. Last number will be 1.

6. (a)Write a program to find least frequent character from a string.

(b) Write a program to print "W" character using '*' symbols.

```
Enter any size:      15
*                           *
*                           *
*                           *
*                           *
*                           *
*                           *
*                           *
*                    *       *
*               *        *   *
*           *            *   *
*         *                *   *
*       *                    *   *
*     *                        *   *
*   *                            *   *
* *                               * *
*                                   *
```