Unit-3 Classes Practice Programs

1. Write a Python class to convert an integer to a roman numeral and vice versa.
2. Write a Python class to find validity of a string of parentheses, '(', ')', '{', '}', '[' and ']'. These brackets must be close in the correct order, for example "()" and "()[]{}" are valid but "[)", "({[)]" and "{{{" are invalid.
3. Write a Python class to get all possible unique subsets from a set of distinct integers.
   Input : [4, 5, 6]
   Output : [[], [6], [5], [5, 6], [4], [4, 6], [4, 5], [4, 5, 6]]
4. Write a Python class to find a pair of elements (indices of the two numbers) from a given array whose sum equals a specific target number.
   Input: numbers= [10,20,10,40,50,60,70], target=50
   Output: 3, 4
5. Write a Python class to find the three elements that sum to zero from a set of n real numbers.
   Input array : [-25, -10, -7, -3, 2, 4, 8, 10]
   Output : [[-10, 2, 8], [-7, -3, 10]]
6. Write a Python class to reverse a string word by word.
   Input string : 'hello .py'
   Expected Output : '.py hello'
7. Write a Python class which has two methods get_String and print_String. get_String accept a string from the user and print_String print the string in upper case.
8. Write a Python class named Rectangle constructed by a length and width and a method which will compute the area and perimeter of a rectangle. Also do the same for Circle, Triangle, Rhombus and Pentagon.
9. You are given two complex numbers, and you have to print the result of their addition, subtraction, multiplication, division and modulus operations. The real and imaginary precision part should be correct up to two decimal places.

   Input Format
   One line of input: The real and imaginary part of a number separated by a space.

   Output Format
   For two complex numbers C and D, the output should be in the following sequence on separate lines:

   - $C + D$
   - $C - D$
   - $C * D$
   - C / D
   - $mod(C)$
   - $mod(D)$

   For complex numbers with non-zero real (A) and complex part (B), the output should be in the following format:
   $A + Bi$
   Replace the plus symbol (+) with a minus symbol (-) when $B < 0$.

For complex numbers with a zero complex part i.e. real numbers, the output should be:
A + 0.00i
For complex numbers where the real part is zero and the complex part is non-zero, the output should be:
0.00 + Bi

Sample Input
```
2 1
5 6
```

Sample Output
```
7.00+7.00i
-3.00-5.00i
4.00+17.00i
0.26-0.11i
2.24+0.00i
7.81+0.00i
```

10. You are given four points *A, B, C* and *D* in a 3-dimensional Cartesian coordinate system. You are required to print the angle between the plane made by the points *A, B, C* and *B, C, D* in degrees(**not radians**). Let the angle be *PHI*.

    Cos(PHI) = (X.Y)/|X||Y| where *X = AB* x *BC* and *Y = BC* x *CD*.

    Here, *X.Y* means the dot product of *X* and *Y*, and *ABxBC* means the cross product of vectors *AB* and *BC*. Also, *AB = B - A*.

    Input Format

    One line of input containing the space separated floating number values of the *X, Y* and *Z* coordinates of a point.

    Output Format

    Output the angle correct up to two decimal places.

    Sample Input
    ```
    0 4 5
    1 7 6
    0 5 9
    1 7 2
    ```

    Sample Output
    ```
    8.19
    ```