

Financial Mathematics with Python Programming

Department of Mathematics

University of Karachi

Lecturer: Engineer Syed Umaid Ahmed

Time Allowed: 3 hours

Note: Attempt any five questions. Each question carries equal marks.

Total Marks: 60

Question no.1:

(12 marks)

Write a code to print this output. Use “for” loop to print the results.

4*1=4

4*2=8

4*3=12

4*4=16

4*5=20

4*6=24

4*7=28

4*9=36

4*10=40

Question no.2:

(12 marks)

Here is the distance between two points in a Google map. Write a function with four arguments to calculate the distance in kilometers. Use haversine formula for this solution.



Question no.3:**(12 marks)**

Write a program to print output of any two of these patterns.

```
*               * * * * *               *
* *            * * * *               * *
* * *         * * *               * * *
* * * *      * *               * * * *
* * * * *    *               * * * * *
```

Question no.4:**(12 marks)**

Write a program using tkinter library that will act as a data collection or feedback unit having at least 10 entries. It should have the capability to save all the data in a separate *.txt file on closing.

OR

Make a simple calculator using tkinter library.

Question no.5:**(12 marks)**

Below is the data given for the population growth of India and Pakistan from 1960 to 2010. Using the matplotlib library, plot a line graph of both the countries so that we can visualize the population growth.

Year = [1960, 1970, 1980, 1990, 2000, 2010]

Population_Pakistan = [44.91, 58.09, 78.07, 107.07, 138.5, 170.6]

Population_India = [449.48, 553.57, 696.783, 870.133, 1000.4, 1309.1]

Also assign the title, legend and labeling on x and y axis.

Question no.6:**(12 marks)**

We have an excel sheet named as 'predictions.csv'. Write a python program that will help in performing these tasks.

- (a) Details of rows and columns
- (b) Calculate the Mean, Median and Standard Deviation of each column
- (c) Find the maximum and minimum values
- (d) Find r-value and p-values (Linear Regression)
- (e) Program to have the scatter plot

Question no.7:**(12 marks)**

Lambda functions are powerful function. Explain a little bit about lambda function. Write a program that can filter odd numbers from a given list. Also use comments to explain the working of your short code.

(a) List_1 = [2,4,5,7,12,18]

(b) List_2 = [1,14,58,17,2,19]

Question no.8:**(12 marks)**

Write a python code that will provide the solution for this equation. Also plot the results with range/limits given.

$$\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \sin(0.2x) + \sin(2x) + 1 \, dx$$

Wish you best of luck for your exams!