

Programming and Data Structures with Python Lab

Lab1. Python Basics, Conditions and Loops

Question1. Write a program in Python to input length and breadth of a rectangle and print the area and perimeter of it.

- Test you code with atleast 2 test cases

Question2. Write a program, which accepts annual basic salary of an employee and calculates and displays the Income tax as per the following rules.

- If Basic is less than Rs. 1,50,000/-, then Tax = 0.
- If Basic is from Rs.1,50,000/- to Rs. 3,00,000/-, then tax is 20%.
- If Basic is greater than Rs.3,00,000/-, then tax is 30%.
- Print name, annual income and tax.
- Write test cases to validate all conditions



Question3. Write a program to accept quantity and rate for three (3) items. Compute the total sales amount. Also compute and print the discount as follows:

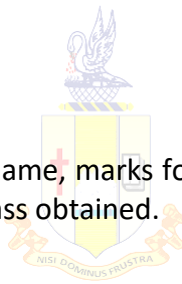
- Amount > Rs. 2000/- : 20% discount
- Amount between Rs. 1500/- to Rs.1999/- :15% discount
- Amount between Rs. 1000/- to Rs.1499/- 8 % discount
- Compute final amount to be paid.
- Print name, rate and quantity of 3 items. Then print total sales amount, total discount and final amount to be paid to shop.
- Write 3 test cases to validate all conditions

Question4. Evaluate the expressions using Pen and Paper first and then print the value.

- $X1 = (11 + 31 + 23 + 8 + 7 + 5) / ((1 - (1/2)) - (1/20))$
- $X2 = (((10 * 8) + 8 - ((7 // 5) \% (5 * 4))) \& 3) | (2 < 1)$

Question5. Write a program to accept name, marks for three subjects and find the total marks secured, average and also display the class obtained.

- Class I – above 80%
- Class II – 60% to 80%
- Pass class – 40% to 59% and
- Fail otherwise



Print a message as “Congratulations << your name>>, you secured a total of <<total marks>>, and Your class is <<class>>”

Test your code with atleast 2 test cases

Question6. Read a number from keyboard. Print whether it is odd number, even number, positive number, negative number or zero. Also, print if its ASCII value represents a lower case or upper case letter or digit.

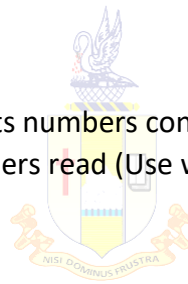
Write 8 test cases to validate odd, even, positive, negative, zero, lower case, upper case and digit input types

Question7. Version Control using Git and GitHub

Read and apply version control features in your code:

<https://ocw.mit.edu/ans7870/6/6.005/s16/classes/05-version-control/>

Question8. Write a program that accepts numbers continuously as long as the number is positive and prints the sum of the numbers read (Use while loop). A sample user interaction will be:



```
Enter a number: 2
Enter a number: 1
Enter a number: 4
Enter a number: 6
Enter a number: -10
Sum = 13
```

Question9. Write a program to take the values of two integers **m** and **n** from the user. Calculate the sum of even number between **m** and **n** (including both **m** and **n**). Please note that value of **m** must be less than value of **n**. If **m > n**. then you must print a message "Value of m should be less than n" and ask for next input values. Print the values of **m**, **n** and **sum**. (Use while loop). The program should continue until user types '**q**' to quit the program.

Sample user interaction:

Enter m: 1

Enter n: 10

Sum of even numbers: 20

Do you want to quit (Type q)? :

Enter m: 2

Enter n: 10

Sum of even numbers: 20

Do you want to quit (Type q)? :

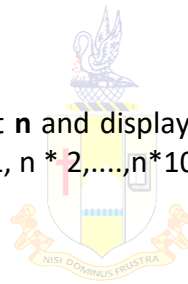
Enter m: 20

Enter n: 10

Value of m should be less than n

Do you want to quit (Type q)? : q

Question10. Write a program to accept **n** and display its multiplication table. Value of **n** must be provided by the user. (Example: $n * 1, n * 2, \dots, n * 10$) (Use for loop)



Question11. Write a program that receives an integer and prints the sum of its digits. For example, an input 125 will print output $1+2+5=8$.

- Try out with the following test cases
- 125
- 12
- 2
- -15

Question12. Develop an application in Python that repeatedly reads numbers until the user enters done. Once done is entered, print out the total, count, and average of the numbers. If the user enters anything other than a number, detect their mistake using try and except and print an error message and skip to the next number.

