lab1-trail

July 11, 2023

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Programming and Data Structures with Python Lab Lab1. Python Basics, Conditions and Loops

Question 1

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

```
<h5> Test you code with atleast 2 test cases</h5>
```

[1]:
```
# getting the values from the users
l = int(input("Enter the length of the rectangle:"))
w = int(input("Enter the width of the rectangle:"))
#displaying the calculated values
print("The Area of the rectangle is {}.".format(l*w))
print("The permimeter of the rectangle is {}.".format(2*(l+w)))
```

```
Enter the length of the rectangle: 23
Enter the width of the rectangle: 34

The Area of the rectangle is 782.
The permimeter of the rectangle is 114.
```

Question 2

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

[14]:
```
#function to calculate tax
def cal_tax(sal):
    if sal < 150000:
        tax = 0
    elif sal >= 150000 and sal <= 300000:
        tax = sal * 0.2
    else:
```

```
        tax = sal * 0.3
    return tax

#getting the values
name = input("Enter your name :")
sal = int(input("Enter your salary :"))

#printing the name, annual income and tax
print("Name : {}".format(name))
print("Annual Income :{}".format(sal))
print("Tax :{}".format(cal_tax(sal)))
```

```
Enter your name : kumar
Enter your salary : 200000
```

```
Name : kumar
Annual Income :200000
Tax :40000.0
```

Question 3

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

[20]:
```
#function for calculating the dicount
def dis_cal(amo):
    if amo > 2000:
        dis = amo * 0.2
    elif amo >= 1500 and amo <= 1999:
        dis = amo * 0.15
    elif amo >= 1000 and amo <= 1400:
        dis = amo * 0.08
    return dis

# getting the values from the user
i_name = input("Enter the name of the item :")
rate = int(input("Enter the rate of the item :"))
quan = int(input("Enter the quantity of the item"))
total_sale_amount = rate * quan
total_discount = dis_cal(total_sale_amount)

#printing
print("ITEM NAME :{}".format(i_name))
```

```
print("RATE :{}".format(rate))
print("QUANTITY :{}".format(quan))
print("TOTAL SALES AMOUNT :{}".format(total_sale_amount))
print("TOTAL DISCOUNT :{}".format(total_discount))
print("FINAL AMOUNT :{}".format(total_sale_amount - total_discount))
```

```
Enter the name of the item : book
Enter the rate of the item : 1500
Enter the quantity of the item 5

ITEM NAME :book
RATE :1500
QUANTITY :5
TOTAL SALES AMOUNT :7500
TOTAL DISCOUNT :1500.0
FINAL AMOUNT :6000.0
```

Question 4

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)

[27]:
```
#X1=(11+31+23+8+7+5)/((1-(1/2)-(1/20)))
x1 = (11 + 31 + 23 + 8 + 7 + 5) / ((1 - ( 1 / 2 ) - ( 1 / 20)))
print(x1)
#X2=(((10*8)+8-((7//5)%(5**4)))&3)|(2<<1)
X2=(((10*8)+8-((7//5)%(5**4)))&3)|(2<<1)
X2
```

```
188.88888888888889
```

[27]:
```
7
```

Question 5

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 <>, and Your class is <>” Test you code with atleast 2 test cases

[34]:
```
#Finding the class
def cal_class(avg_mark):
    if avg_mark > 80:
        return "CLASS I"
    elif avg_mark >= 60 and avg_mark <= 80:
```

```
        return "CLASS II"
    elif avg_mark >= 40 and avg_mark <= 59:
        return "PASS CLASS"
    else:
        return "FAIL"
# getting the value
name = input("Enter your name :")
mark1 = int((input("Enter subject 1 mark :")))
mark2 = int((input("Enter subject 2 mark :")))
mark3 = int((input("Enter subject 3 mark :")))
total_mark = mark1 + mark2 + mark3
avg_mark = total_mark/3

print("Congratulations {}, you secured a total of {}, and Your class is {}".
 ↪format(name, total_mark, cal_class(avg_mark)))
```

```
Enter your name : pavi
Enter subject 1 mark : 80
Enter subject 2 mark : 89
Enter subject 3 mark : 90

Congratulations pavi, you secured a total of 259, and Your class is CLASS I
```

Question 6

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

[55]:
```
def is_even(num):
    return num % 2 == 0

def is_odd(num):
    return num % 2 != 0

def is_positive(num):
    return num > 0

def is_negative(num):
    return num < 0

def is_zero(num):
    return num == 0

num = int(input("Enter a number :"))
```

```
print("The Number {} is".format(num), end= " ")
if is_zero(num):
    print("neither positive nor negative.", end= " ")
elif is_odd(num):
    print("Odd", end= " ")
elif is_even(num):
    print("Even", end= " ")

if is_positive(num):
    print("and Positive Number.")
elif is_negative(num):
    print("and Negative Number.")


print("The num {} represents".format(num), end=" ")
if num >= 45 and num <= 57:
    print("a digit")
elif num >= 65 and num <= 90:
    print("uppercase")
elif num >= 97 and num <= 122:
    print("lowercase")
```

```
Enter a number : 95

The Number 95 is Odd and Positive Number.
The num 95 represents
```

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/

Question 8

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

[61]:
```
total_num = 0
while True:
    num = int(input("Enter a number :"))
    if num < 0:
        break
    else:
        total_num += num
```

```
print("Sum =", total_num)
```

```
Enter a number : 45
Enter a number : 34
Enter a number : 67
Enter a number : 22
Enter a number : 4
Enter a number : 7
Enter a number : -11

Sum = 179
```

Question 9

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

[66]:
```
print("Sample user interaction:")
while True:
    sum = 0
    m = int(input("Enter m: "))
    n = int(input("Enter n: "))
    if n < m:
        print("Value of m should be less than n")
    else:
        for i in range(m, n):
            if i % 2 == 0:
                sum += i
        print("Sum of even numbers :",sum)
    quit = input("Do you want to quit (Type q)? :")
    if quit == 'q':
        break
    print()
```

```
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
```

Question 10

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,….,n*10) (Use for loop)

[71]:
```
num = int(input("Enter the number: "))
for i in range(1, 11):
    print("{} X {} = {}".format(num, i , num * i))
```

```
Enter the number:  5

5 X 1 = 5
5 X 2 = 10
5 X 3 = 15
5 X 4 = 20
5 X 5 = 25
5 X 6 = 30
5 X 7 = 35
5 X 8 = 40
5 X 9 = 45
5 X 10 = 50
```

Question 11

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

[83]:
```
num = input("Enter the number :")
sum = 0
for i in num:
```

```
    sum += int(i)
print(sum)
```

```
Enter the number : 123456789
```

```
45
```

Question 12

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.

[89]:
```
total = 0
count = 0
while True:
    num = input("Enter a number: ")
    if num == "done":
        break
    else:
        try:
            num = float(num)
        except ValueError:
            print("Invalid input. Enter a number")
            continue
    total += num
    count +=1

avg = total/count
print("Total :{}".format(total))
print("Count :{}".format(count))
print("Average :{}".format(avg))
```

```
Enter a number:  5
Enter a number:  5
Enter a number:  done
```

```
Total :10.0
Count :2
Average :5.0
```