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**Assignment on functions**

**Program 1**

Write a program in Python using function (recursive and non recursive) to generate Fibonacci series up to nth term. Then n is provided as input and passed to the function

n=int(input("enter a number "))

*#part 1*

def fibo(n):

   if n <= 1:

       return n

   else:

       return(fibo(n-1) + fibo(n-2))

print("Fibonacci Series: using recursive code ", end = " ")

for i in range(n):

    print(fibo(i+1),end=" ")

print()

*#part 2*

first = 0

second= 0

sum = 1

count = 1

print("Fibonacci Series: using non recursive code", end = " ")

while(count <= n):

    print(sum, end = " ")

    count += 1

    first = second

    second = sum

    sum = first + second

print()

**Output of Program 1**

enter a number 5

Fibonacci Series: using recursive code 1 1 2 3 5

Fibonacci Series: using non recursive code 1 1 2 3 5

**Program 2**

Write a program in Python using function to generate Pascal’s triangle of n rows.

n=int(input("Enter number of rows "))

print("Pascals triangle is ")

*# iterate upto n*

*# Print Pascal's Triangle in Python*

from math import factorial

*# input n*

*# n = 5*

for i in range(n):

    for j in range(n-i+1):

*# for left spacing*

        print(end=" ")

    for j in range(i+1):

*# nCr = n!/((n-r)!\*r!)*

        print(factorial(i)//(factorial(j)\*factorial(i-j)), end=" ")

*# for new line*

    print()

**Output of Program 2**

Enter number of rows 8

Pascals triangle is

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

**Program 3**

Write a menu driven Python program to perform basic mathematical operations. All the operations are defined as functions. The user can continue operation as long the user wants. The operations are addition, subtraction, multiplication, division, and exponentiation.

try:

    def add(a,b):

        return a+b

    def multiply(a,b):

        return a\*b

    def subtract(a,b):

        return a-b

    def divide(a,b):

        return a/b

    def exponentiation(a,b):

        return a\*\*b

    x=input("Enter operator which may be \*,/,-,+,^  ")

    a=int(input("Enter number "))

    b=int(input("Enter number "))

    if(x=="\*"):

        print(multiply(a,b))

    elif(x=="+"):

        print(add(a,b))

    elif(x=="-"):

        print(subtract(a,b))

    elif(x=="/"):

        print(divide(a,b))

    elif(x=="^"):

        print(exponentiation(a,b))

except:

    print("Wrong Inputs ")

**Output of Program 3**

Enter operator which may be \*,/,-,+,^ +

Enter number 5

Enter number 6

11

**Program 4**

Write a Python program which calculates volume of a box using function. The number of arguments passed, are at most three and at least zero

def boxVolume( length = 1, width = 1, height = 1 ):

    return length \* width \* height

print("Default values are taken as 1 ")

print("Length is 10,Width is 20,Height is 30")

print("Volume of box is ",boxVolume(10,20,30))

print("Length is 10 Width is 20")

print("Volume of box is ",boxVolume(10,20))

print("Length is 10")

print("Volume of box is ",boxVolume(10))

**Output of Program 4**

Default values are taken as 1

Length is 10,Width is 20,Height is 30

Volume of box is 6000

Length is 10 Width is 20

Volume of box is 200

Length is 10

Volume of box is 10

**Program 5**

Write a Python program using function that computes P(n,r)

*#calculating nPr*

try:

*#step 1 calculating factorial*

    def fact(n):

        if(n==0 or n==1):

            return n

        return n\*fact(n-1)

*#step 2 taking input*

    n=int(input("Enter a number n "))

    r=int(input("Enter a number r(r<=n) "))

*#step 3 nPr calculation*

*#nPr=n!/(n-r)!*

    if(r>n):*#we cannot calculate nPr if r>n*

        print("Wrong input")

    else:

        answer=(1.0\*fact(n))/(fact(n-r))

        print(f"{n}P{r}(nPr) is {answer} ")

except:

    print("Only integer inputs allowed ")

**Output of Program 5**

Enter a number n 5

Enter a number r(r<=n) 3

5P3(nPr) is 60.0

**Program 6**

Write a Python program using function to check whether a number is prime or not.

def prime(n):

    c=0

    if(n<=1):*#1st point of elimination*

        return 0

    for i in range(2,n):

        if(n%i==0):*#2nd point of elimination*

            return 0

    return 1

*#take input*

n=int(input("Enter a number "))

if(prime(n)==1):

    print(f"{n} is prime ")

else:

    print(f"{n} is not prime ")

**Output of Program 6**

Enter a number 7

7 is prime

**Program 7**

Write a Python program using function which accepts n as input and returns the average from 1 to n, calculates median and mode.

*# average calculation*

n=int(input("Enter a number "))

avg=(n+1)/2

print(f"Average is from 1 to {n} is {avg}")

*# median calculation*

median=0

if(n&1):

    median=(n//2)+1

else:

    median=((n//2)+((n//2)+1))/2

print(f"Median from 1 to {n} is {median}")

print("For mode calculation, enter list of numbers in single line separated by spaces ")

l=list(map(int,input().split()))

dict={}

for i in l:

    if (i in dict):

            dict[i] += 1

    else:

            dict[i] = 1

print(dict)

maxi=-1

maxi\_item=0

for x in dict:

    if(maxi<dict[x]):

        maxi=dict[x]

        maxi\_item=x

print(f"Mode is {maxi\_item} present {maxi} times")

**Output of Program 7**

Enter a number 5

Average is from 1 to 5 is 3.0

Median from 1 to 5 is 3

For mode calculation, enter list of numbers in single line separated by spaces

-5 -5 -5 2 2 -4 1 1

{-5: 3, 2: 2, -4: 1, 1: 2}

Mode is -5 present 3 times

**Assignment on Modules**

Program 1

try:

    import calendar

    n=int(input("Enter a number "))

    if(n<0):

        raise Exception

*# using calendar to print calendar of year*

    print (f"The calendar of year {n} is : ")

    print (calendar.calendar(n))

except:

    print("Invalid year entered ")

Output of Program 1

The calendar of year 2022 is :

2022

January February March

Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su

1 2 1 2 3 4 5 6 1 2 3 4 5 6

3 4 5 6 7 8 9 7 8 9 10 11 12 13 7 8 9 10 11 12 13

10 11 12 13 14 15 16 14 15 16 17 18 19 20 14 15 16 17 18 19 20

17 18 19 20 21 22 23 21 22 23 24 25 26 27 21 22 23 24 25 26 27

24 25 26 27 28 29 30 28 28 29 30 31

31

April May June

Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su

1 2 3 1 1 2 3 4 5

4 5 6 7 8 9 10 2 3 4 5 6 7 8 6 7 8 9 10 11 12

11 12 13 14 15 16 17 9 10 11 12 13 14 15 13 14 15 16 17 18 19

18 19 20 21 22 23 24 16 17 18 19 20 21 22 20 21 22 23 24 25 26

25 26 27 28 29 30 23 24 25 26 27 28 29 27 28 29 30

30 31

July August September

Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su

1 2 3 1 2 3 4 5 6 7 1 2 3 4

4 5 6 7 8 9 10 8 9 10 11 12 13 14 5 6 7 8 9 10 11

11 12 13 14 15 16 17 15 16 17 18 19 20 21 12 13 14 15 16 17 18

18 19 20 21 22 23 24 22 23 24 25 26 27 28 19 20 21 22 23 24 25

25 26 27 28 29 30 31 29 30 31 26 27 28 29 30

October November December

Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su

1 2 1 2 3 4 5 6 1 2 3 4

3 4 5 6 7 8 9 7 8 9 10 11 12 13 5 6 7 8 9 10 11

10 11 12 13 14 15 16 14 15 16 17 18 19 20 12 13 14 15 16 17 18

17 18 19 20 21 22 23 21 22 23 24 25 26 27 19 20 21 22 23 24 25

24 25 26 27 28 29 30 28 29 30 26 27 28 29 30 31

31

Program 2

try:

    import calendar

    def check(n):

        if(n<0):

            raise Exception

        if((n%4==0 and n%100!=0) or (n%400==0)):

            return 1

        else:

            return 0

    print("Enter range of year from ... to …")

    x=int(input("First input "))

    y=int(input("Second input "))

    c=0

    for i in range(x,y+1,1):

        if(check(i)):

            c=c+1

            print(f"year {i} is Leap")

        else: print(f"year {i} is not leap ")

    print(f"Total {c} leap years ")

except:

    print("Invalid input given")

Output of Program 2

Enter range of year from ... to …

First input 1995

Second input 2003

year 1995 is not leap

year 1996 is Leap

year 1997 is not leap

year 1998 is not leap

year 1999 is not leap

year 2000 is Leap

year 2001 is not leap

year 2002 is not leap

year 2003 is not leap

Total 2 leap years

Program 3

*# Python program to display calendar of given month of the year*

try:

    import calendar

    y=int(input("Enter a number "))

    m=int(input("Enter a number "))

    if(y<0 or m<0):

        raise Exception

*# display the calendar*

    print(calendar.month(y, m))

except:

    print("Invalid year entered ")

Output of Program 3

Enter a year 2012

Enter a month 12

December 2012

Mo Tu We Th Fr Sa Su

1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

31