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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 ")

```

The calendar of year 2022 is :
2022

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
```