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Assignment on Python Functions

Program 1

Write a program in Python using function (recursive and non recursive) to generate Fibonacci series up to nth term. The 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 ")
l=[]
for i in range(n):
    l1=[]
    l1.append(1)
    for j in range(1,i):
        l1.append(l[i-1][j-1]+l[i-1][j])
    if(i!=0):
        l1.append(1)
    l.append(l1)
space=n-1
for i in range(len(l)):
    for j in range(space):
        print(end=" ")
    for j in range(len(l[i])):
        print(l[i][j],end=" ")
    space=space-1
    print()
```

Output of Program 2

Enter number of rows 7

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
```

Program 3

Write a program in Python which will calculate GCD of n numbers using function where n is given as input.

```
try:
    def gcd_func(a,b):
        if(b==0):
```

```

        return a
    return gcd_func(b,a%b)
c=list(map(int,input("Enter numbers in single line ").split()))
overall_gcd=0
for i in range(len(c)):
    overall_gcd=gcd_func(overall_gcd,c[i])
print("Overall GCD of list is",overall_gcd)
except:
    print("Wrong Inputs Given ")

```

Output of Program 3

Enter numbers in single line 7 14 21
Overall GCD of list is 7

Program 4

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 4

Enter operator which may be *,/,-,+,^ ^
Enter number 3
Enter number 3
27

Program 5

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 5

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 6

Write a Python program using function which prints the name of the subjects you like to read. The total number of subjects may vary. The subject names are passed as arguments

```
def print_subjects(*list_of_subjects):
    print("Subjects are")
    for x in list_of_subjects:
        print(x,end=" ")
    print()
a=list(map(str,input("Enter all subjects name in single line:-").split()))
print_subjects(a)
```

Output of Program 6

Enter all subjects name in single line:-science computer history biology

Subjects are

['science', 'computer', 'history', 'biology']

Program 7

Write a Python program using function which calculates simple interest. The rate of interest for senior citizen is 12% and for others is 10%.

```
#Simple Interest is principal*rate*time
try:
    age=int(input("enter age "))
    principal=int(input("Enter principal amount "))
    rate=0.0
    if(age>=60):
        rate=0.12
    elif(age>=0 and age<60):
        rate=0.10
    else:
        raise Exception
    t=int(input("Enter number of years "))
    interest=(principal*rate*t)
    print("Interest is",interest)
except:
    print("Wrong inputs given ")
```

Output of Program 7

enter age 18

Enter principal amount 600

Enter number of years 10

Interest is 600.0

Program 8

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 8

Enter a number n 10
 Enter a number r(r<=n) 5
 10P5(nPr) is 30240.0

Program 9

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

```

#calculating nCr
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 nCr calculation
    #nCr=n!/((n-r)!*r!)

```

```

    if(r>n):#we cannot calculate nPr if r>n
        print("Wrong input")
    else:
        answer=(1.0*fact(n))/(fact(n-r)*fact(r))
        print(f"{n}C{r}(nCr) is {answer} ")
except:
    print("Only integer inputs allowed ")

```

Output of Program 9

Enter a number n 10
Enter a number r(r<=n) 5
10C5(nCr) is 252.0

Program 10

Write a Python program using function which finds out maximum and minimum of three numbers.

```

#function calculates maximum
def max_func(a,b):
    if a>b:
        return a
    else:
        return b

a=int(input("Enter a number "))
b=int(input("Enter a number "))
c=int(input("Enter a number "))
print("Maximum number is",max_func(max_func(a,b),c))

```

Output of Program 10

Enter a number 2
Enter a number 3
Enter a number -1
Maximum number is 3

Program 11

Write a Python program to count the number arguments passed as command line arguments and print the program name. Also print the arguments.

```

import sys
#0-th index of argv contains file path

```

```
program_path=sys.argv[0]
#file name is written after the last backslash in program_path
#rfind returns last occurrence of an element
index_of_backslash=program_path.rfind("\\")
#file name starts after index of backslash so we add 1
program_name=program_path[index_of_backslash+1:]
command_line_arguments=sys.argv[1:]#extracting the cmd line arguments
count=len(command_line_arguments)
print("Program name is ",program_name)
for value,item in enumerate(command_line_arguments):
    print(f"{value}-th command line argument is {item}")
print("Number of command line arguments are ",count)
```

In terminal we write:-

python 11.py akash gets 90 out of 100

Output of Program 11

Program name is 11.py

0-th command line argument is akash

1-th command line argument is gets

2-th command line argument is 90

3-th command line argument is out

4-th command line argument is of

5-th command line argument is 100

Number of command line arguments are 6