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**EXERCISE 1 : Programs on Basic Concepts**

1. A civil contractor has mistakenly taken the measurement in feet instead of centimeter. Help him to convert the given feet value into a centimeter (Write a Python program to convert the length in feet to centimetre.)

#To convert the length in feet to centimeter

f=int(input("Enter height in feet: "))

c=f\*30

print(f,"Ft =",c,"cm")

2. Mr. Ashok has dig a borewell just without any measurement but some how he was able to get the radius of the borewell , now he wants to find the area & perimeter of the borewell, so help Ashok for the same.

#To compute area and perimeter of the borewell

import math

r=input("Enter radius: ")

p=2\*math.pi\*r

a=math.pi\*r\*\*2

print("Area =",a,"\nPerimeter =",p)

3. Ms. Bob has drawn a triangle using a scale with measuring all different sides of the triangle, but not aware of the angles between sides of the triangle. Help him to find the area of a triangle.

#To find area of triangle given sied of the triangle

a=int(input("Enter side 1: "))

b=int(input("Enter side 2: "))

c=int(input("Enter side 3: "))

s=(a+b+c)/2

Area=(s\*(s-a)\*(s-b)\*(s-c))\*\*0.5

print("Area of triangle= ",Area)

4. Mr. Alex only knows that a year has 365 days(ignoring leap year), and he knows his age only in terms of no. Of days, help him to find his age in years, weeks & days.

Example- 375 days is equal to 1 year 1 week & 3 days. Find (Ignore leap year)

#Find age in years,weeks,days

n=int(input("Enter the number of days: "))

years=n//365

weeks= (n%365)//7

days= (n%365)%7

print(n," days = ",years," years ",weeks," weeks &", days," days")

**EXERCISE 2 : Programs using 'input()' & Library Functions**

1. A Security agency company has a string of 4 characters to be communicated with its clients, but wants to encode it in the form of ASCII/UTF Code and send. Help them to convert that given string of 4 characters into its equivalent ASCII/UTF code.

str=input("Enter a string: ")

a=ord(str[0])

b=ord(str[1])

c=ord(str[2])

d=ord(str[3])

print("The new string: ",a,b,c,d,sep='”')

2. An 10th standard child is given a number and been asked to do the following

a)round off the nearest int

b)round off to the first dec place

c)round off to the second dec place

Give the child a solution to do the task listed above.

a=input("Enter a float number: ")

print("Rounded off number: ",round(a))

print("Rounded off number to first decimal place: ",round(a,1))

print("Rounded off number to second decimal place ",round(a,2))

**EXERCISE 3 : Working with Library Functions & Simple Programs**

1. Mrs. Allen is been asked to design and simulate the working of a simple calculator. Help Mrs. Allen to implement the operations +,-,\*,/,%,//,\*\* in her calculator design.

a,b=input("Enter 2 numbers: ").split(" ")

print("\n Sum:",a+b)

print("\n Difference:",a-b)

print("\n Product:",a\*b)

print("\n Division:",a/b)

print("\n Modulus:",a%b)

print("\n Floor Division:",a//b)

print("\n Exponentiation :",a\*\*b)

2. Mr. Alex is givena deck of 52 cards and asked to do the following

i)shuffle the deck of cards

ii)to choose one single card from deck

iii)to create a random sample of size 2 from available deck of cards,

but is very new to do this game. Help him to do the same by implementing in program.

import random

deck=["Diamonds","Spades","Heart","Clubs"]

print("Before shuffling:",deck)

random.shuffle(deck)

print("After shuffling:",deck)

print("Randomly drawing a suit:",random.choice(deck))

New\_deck=random.sample(deck,2)

print("New deck:",New\_deck)

3. A computer programmer has stored two numbers in two memory locations, but now he wants to swap them. Help him to complete this task using temporary variable and without using temporary variable.

#Swap two numbers using temporary variable

a,b=input("Enter 2 numbers: ").split(" ")

print("Before swapping:\n a:",a,"\t b:",b)

temp=a

a=b

b=temp

print("After swapping:\na:",a,"\tb:",b)

#Swap two numbers without using temporary variable

a,b=input("Enter 2 numbers: ").split(" ")

print("Before swapping:\na:",a,"\tb:",b)

a=a^b

b=a^b

a=a^b

print("After swapping:\na:",a,"\tb:",b)

**EXERCISE 4 : Programs on Control Structures**

1. A mathematics teacher has given a problem to a student to find the roots of a Quadratic equation - a x^ 2 + bx + c. And also given a case study with the values as a = 0, b\*b - 4ac > = 0, b\*b - 4ac < 0. But the student is very week in mathematics. So could u help the student to do this task using programming? (roots are real & distinct, roots are real & equal, roots are imaginary)

#To find roots of a quadratic equation

print("Equation is in the form of : ax^2+bx+c")

a,b,c=input("Enter a,b,c respectively (seperated by','): ").split(",")

D =(b\*\*2)-(4\*a\*c)

if D==0:

print("Roots are real and equal.\nRoots are”)

root1=root2= (-b)/(2\*a)

print(root1,root2)

elif D>0:

print("Roots are real and unequal.\nRoots are: ")

root1= ((-b)+D\*\*0.5)/(2\*a)

root2= ((-b)-D\*\*0.5)/(2\*a)

print("Root 1: ",root1,"\nRoot 2: ",root2)

else:

print("Roots are imaginary.\nRoots are: ")

real= (-b)/(2\*a)

imag=(D\*\*0.5)/(2\*a)

print("Root 1: ",real,“+ ”,imag);

print("Root 2: ",real, “- ”,imag);

1. Mr. Disney is given with a number and been asked to do two arithmetic operations + and \*. As an example, given a number 4 the result should be

1 + 2 + 3 + 4 = 10

1 \* 2 \* 3 \* 4 = 24

so help Mr. Disney to achieve this task.

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

sum=0. prod=1

for i in range(1,n+1):

sum+=i

if(i == n):

print(i,end=" = ")

print(sum)

else:

print(i,end=" + ")

for i in range(1,n+1):

prod\*=i

if(i == n):

print(i,end=" = ")

print(prod)

else:

print(i,end=" \* ")

1. A pebble shop keeper has kept some pebbles in a glass bottle with each having different count,help him to find out how many bottles are with odd number of pebbles and how many are with even number of pebbles.?

n=int(input("Enter the number of elements: "))

l=[]

print("Enter the elements: ")

for i in range(n):

a=int(input())

l.append(a)

counte,counto=0,0

for i in l:

if(i%2):

counto+=1

else:

counte+=1

print("Number of bottles with ODD number of pebbles:",counto)

print("Number of bottles with EVEN number of pebbles:",counte)

**EXERCISE 5: Programs on Control Structures**

1. Find all factors of a given number. Count the number of factors. Check whether a given number is a prime number

# Program to find the factors of a number

x=int(input(“Enter a number”))

count=0

print("The factors of",x,"are:")

for i in range(1, x+1):

if x % i == 0:

print(i)

count=count+1

print(“The number of factors are “,count)

if(count<=2):

print(“The number”,x, “is a prime number”)

else:

print(“The number”,x, “is not a prime number”)

1. Check whether a given number is a

a) perfect square

b) fibonacci number

c) perfect power of 2

1. To check whether a number is a perfect square

i=1

flag=0

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

while(i\*\*2<=n):

if( i\*\*2 == n):

flag=1

print("The number is a perfect square")

i+=1

if(flag==0):

print("The number is not a perfect square")

1. # To check whether a number is a fibonacci number

n=input("Enter a number:")

n=int(n)

i=0

fibo=[0,1]

flag=0

while(fibo[i]<=n):

if(n in fibo):

flag=1;

fibo.append(fibo[i]+fibo[i+1])

i=i+1

if flag:

print("The number entered is a Fibonacci number")

else:

print("The number entered is not a Fibonacci number")

1. To check whether a number is a perfect power of 2

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

i=0

flag=0

while(2\*\*i<=n):

if(2\*\*i==n):

print("The number is a perfect power of 2")

flag=1

i+=1

if(flag==0):

print("The number is not a perfect power of 2")

1. Check whether a number is a perfect number or not.

Perfect number is a positive number, which is the sum of its all positive divisors excluding that number and is equal to that number itself.

For example, 6 is perfect number since divisor of 6 are 1, 2 and 3. Sum of its divisor is 1 + 2+ 3 = 6 (6 is the smallest perfect number). Examples of other perfect numbers are 28,496,8128

# Check whether a number is a perfect number or not.

sum=0

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

for i in range(1,n):

if(n%i==0):

sum+=i

if(sum==n):

print("The number is a perfect number")

else:

print("The number is not a perfect number")

**EXERCISE 6 : Programs on Strings and Sets**

1. Find cartesian product of sets.

#Cartesian product of two sets

s1,s2=set(),set()

n1=int(input("Enter the number of elements for set 1: "))

print("Enter the elements: ")

for i in range (n1):

s1.add(int(input()))

n2=int(input("Enter the number of elements for set 2: "))

print("Enter the elements: ")

for i in range (n2):

s2.add(int(input()))

s1=list(s1); s2=list(s2)

n1=len(s1);n2=len(s2)

cp=set()

for i in range(n1):

for j in range(n2):

cp.add(tuple((s1[i],s2[j])))

cp=sorted(list(cp))

print("The cartesian product is:",cp,sep="\n")

2.Program to count number of characters (all), alphabets, digits & special characters in a given string & print the same.

countA,countD,countS,count=0,0,0,0

s=input("Enter a string: ")

for i in range(len(s)):

if(s[i].isalpha()):

countA+=1

elif(s[i].isdigit()):

countD+=1

elif (s[i]!=" "):

countS+=1

count+=1

print("Number of:\n1.Characters:",count,"\n2.Alphabets:",countA)

print("3.Numbers:",countNUM,"\n4.Special characters(excluding space):",countS)

3.Given a list of strings, count and print the number of strings where the string length is 2 or more &the 1st & last characters are same.

l=[]

n=int(input("Enter the number of strings: "))

for i in range(n):

l.append(input("Enter string: "))

count=0

for i in l:

if(len(i)>=2 and i[0]==i[-1]):

count+=1

print("Number of required string: ",count)

4.Program to reverse each word in a given sentence.

s=input("Enter a string: ").split()

for i in s:

print(i[::-1],end=" ")

**EXERCISE 7: Programs on list and Dictionary**

1. Given a list : SRN, P\_marks, C\_marks, M\_marks and B\_marks.

a) Create a dict with SRN as the key and marks in P, C, M, B as a list.

b) Make another dict of srn and total marks. display in the order of marks.

c) Make a dict with M\_marks as the key and names of students with the same marks.

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A={}

SRN,P\_marks,C\_marks,M\_marks,B\_marks=[],[],[],[],[]

n=int(input("Enter the number of records: "))

for i in range(n):

SRN.append(input("Enter the SRN: "))

for i in range(n):

P\_marks.append(int(input("Enter P marks: ")))

for i in range(n):

C\_marks.append(int(input("Enter C marks: ")))

for i in range(n):

M\_marks.append(int(input("Enter M marks: ")))

for i in range(n):

B\_marks.append(int(input("Enter B marks: ")))

for i in range(n):

A[SRN[i]]=[P\_marks[i],C\_marks[i],M\_marks[i],B\_marks[i]]

##################### PART A ################################################

for i in A:

print(i,"==>",end=" ")

for j in A[i]:

print(j,end=" ")

print()

###################### PART B ###############################################

Total={}

for i in A:

Total[i]=sum(A[i])

for i,j in sorted(Total.items(), key=lambda a: a[1]):

print(i,"==>",j)

###################### PART C ###############################################

student\_details={}

for i in M\_marks:

student\_details[i]=[]

for j in A:

if(i==A[j][2]):

student\_details[i].append(j)

print(student\_details)

1. Find the mode ofthe given list using dictionary : num\_list=[1,2,3,4,1,1,2,3,1]

num\_list=[]

n=int(input("Enter number of values for num\_list: "))

print("Enter the elements:")

for i in range(n):

num\_list.append(int(input()))

mode={}

for i in num\_list:

mode.setdefault(i,0)

mode[i]+=1

print(mode)

m=0

for i in mode:

if m <= mode[i]:

m = mode[i]

print("mode =",m)

3. Find the mean and standard deviation for the given list ofelements : l=[1,2,3,4]

l=[]

n=int(input("Enter number of values for num\_list: "))

print("Enter the elements:")

for i in range(n):

l.append(int(input()))

mean=sum(l)/len(l)

s=0

for i in l:

s+=(i-mean)\*\*2

SD=(s/len(l))\*\*0.5

print("Mean:",mean,"\nStandard Deviation:",SD)

**EXERCISE 8 : Programs on Functions**

1. Given two lists as arguments (marks and names), write a function to return a tuple containing the highest marks andthe corresponding name.

Example:

x = [ 90,70,95, 60]

y= [ 'a','b', 'c' , 'd' ]

res=(95, 'c')

def Highest (marks,name):

if (len(marks)!=len(name)):

return"Number of records mismatch"

max\_marks=max(marks)

index=[]

for i in range(len(marks)):

if marks[i]==max\_marks:

index.append(i)

res=[]

for i in index:

res.append((marks[i],name[i]))

return res

def enter(l,n,text=False):

print("Enter the elements:")

for i in range(n):

if(text):

l.append(input())

else:

l.append(int(input()))

marks,names=[],[]

n1=int(input("Enter the number of mark: "))

enter(marks,n1)

n2=int(input("Enter the number of names: "))

enter(names,n2,True)

print(marks,names,sep="\n")

print(Highest(marks,names))

2. Given a dict where values are not unique, write a function to create a new dict where the key is the value andthe value is concatenated keys ofthe original dict and return it.

Example:

x = { 'apple' : 'fruit', 'cat':'mammal','mango' : 'fruit','dog': 'mammal', 'beans':'veg'}

res = { 'fruit' : [ 'apple', 'mango' ], 'mammal' : [ 'cat', 'dog' ], 'veg' : ['beans']}

def mod (d):

res={}

for i in d:

if d[i] not in res:

res[d[i]]=[]

res[d[i]].append(i)

else:

res[d[i]].append(i)

return res

x = { 'apple' : 'fruit', 'cat' : 'mammal', 'beans' : 'veg', 'dog' :

'mammal','mango' : 'fruit','brinjal':'veg','potato':'veg','horse':'mammal' }

print(mod(x))

3. def is\_square(x) :pass

check whether a given number is a perfect square

def is\_even(x) : pass

check whether a given number is an even number

# this could be another set of functions!

find all numbers between 1 and n which are both square and even

def is\_square (n):

if int(n\*\*0.5)==n\*\*0.5:

return True

else:

return False

def is\_even (n):

if n%2:

return False

else:

return True

n=int(input("Enter upperlimit:"))

for i in range(2,n+1,2): #is\_even function is redundant

if is\_even(i) and is\_square(i):

print(i,end=" ")

**EXERCISE 9 : Programs on Files and modules**

1.Given a file, create a new file with line numbers.

2.Compare given two files

i) output union

ii) output intersection

iii) output those in file1 and not in file2

iv) symmetric difference

3.Input file is a python program with function definitions.

i) Identify the leaders and Write them to another file

ii) Identify the functions and print them

4.Create a module called Util.py. Add functions for the following into this file.

a) convert temperature in Centigrade to Fahrenheit

b) convert temperature in Fahrenheit to Centigrade

5.Create a module called MyStat.py. Support functions:

- sum

- average

- standard deviation

**EXERCISE 10: Programs on oops & exceptions**

1. Create a class Matrix. Provide a constructor which takes the dimension ofthe matrix and fills with 0. Provide a function to - read and populate the matrix - add two matrices – display
2. Create a class bill. bill should contain date, customer name and details of # of items – name, rate, quantity, total amount. Make a bill and display it.
3. Write a program to handle an exception when user try to write contents to a file which is created in read mode
4. Write a program to find reciprocal of elements in given list,L=[‘a’,0,2] and handle the exception when you are finding reciprocal for the values 0 and ‘a’.

**EXERCISE 11 : Programs on GUI and Web Site Development**