

**Computer Science and Engineering Department****Artificial Intelligence (UCS 521)****Lab Assignment-1**

1. **A class with 10 students wants to produce some information from the results of the four standard tests in Maths, Science, English and IT. Each test is out of 100 marks. The information output should be the highest, lowest and average mark for each test and the highest, lowest and average mark overall. Write a program in Python to complete this task.**

**CODE:**

```
print("Enter marks of students in Maths : ",end=" ")
M = list(int(i) for i in input().split())
print(M)
print("Enter marks of students in Science : ",end=" ")
S = list(int(i) for i in input().split())
print(S)
print("Enter marks of students in English : ",end=" ")
E = list(int(i) for i in input().split())
print(E)
print("Enter marks of students in IT : ",end=" ")
I = list(int(i) for i in input().split())
print(I)
print("\n")
print("Maximum Marks in Maths = ",max(M))
print("Minimum Marks in Maths = ",min(M))
print("Average Marks in Maths = ",sum(M)/len(M))
print("\n")
print("Maximum Marks in Science = ",max(S))
print("Minimum Marks in Science = ",min(S))
print("Average Marks in Science = ",sum(S)/len(S))
print("\n")
print("Maximum Marks in English = ",max(E))
print("Minimum Marks in English = ",min(E))
print("Average Marks in English = ",sum(E)/len(E))
print("\n")
print("Maximum Marks in IT = ",max(I))
print("Minimum Marks in IT = ",min(I))
print("Average Marks in IT = ",sum(I)/len(I))
print("\n")
print("Highest overall Marks",max(max(M),max(max(S),max(max(E),max(I)))))
print("Lowest overall Marks",min(min(M),min(min(S),min(min(E),min(I)))))
print("Overall Average Marks",(sum(E)+sum(M)+sum(S)+sum(I))/40)
```

**OUTPUT:**

```
Shell Clear

Enter marks of students in Maths : 40 50 60 70 80 90 40 50 60 70
[40, 50, 60, 70, 80, 90, 40, 50, 60, 70]
Enter marks of students in Science : 40 50 60 70 80 90 40 50 60 70
[40, 50, 60, 70, 80, 90, 40, 50, 60, 70]
Enter marks of students in English : 40 50 60 70 80 90 40 50 60 70
[40, 50, 60, 70, 80, 90, 40, 50, 60, 70]
Enter marks of students in IT : 40 50 60 70 80 90 40 50 60 70
[40, 50, 60, 70, 80, 90, 40, 50, 60, 70]

Maximum Marks in Maths = 90
Minimum Marks in Maths = 40
Average Marks in Maths = 61.0

Maximum Marks in Science = 90
Minimum Marks in Science = 40
Average Marks in Science = 61.0

Maximum Marks in English = 90
Minimum Marks in English = 40
Average Marks in English = 61.0

|
Maximum Marks in IT = 90
Minimum Marks in IT = 40
Average Marks in IT = 61.0

Highest overall Marks 90
Lowest overall Marks 40
Overall Average Marks 61.0
~
```

2. Write a Python Program to input basic salary of an employee and calculate its Gross salary according to following: Basic Salary  $\leq$  10000 : HRA = 20%, DA = 80% Basic Salary  $\leq$  20000 : HRA = 25%, DA = 90% Basic Salary  $>$  20000 : HRA = 30%, DA = 95%.

**CODE:**

```
print("Enter Basic Salary = ",end=" ")
basic_salary=int(input())
print(basic_salary)
if basic_salary <= 10000 :
    hra = 0.20*basic_salary
    da = 0.80*basic_salary
elif basic_salary <= 20000 :
    hra = 0.25*basic_salary
    da = 0.90*basic_salary
else:
    hra = 0.30*basic_salary
    da = 0.95*basic_salary
gross_salary = basic_salary + hra + da
```

```
print("Gross Salary = ",gross_salary)
```

**OUTPUT:**

```
Shell
Enter Basic Salary = 12000
12000
Gross Salary = 25800.0
> |
```

**3. Write a Python program to check the validity of password input by users.****Validation:**

- ☐ At least 1 letter between [a-z] and 1 letter between [A-Z].
- ☐ At least 1 number between [0-9].
- ☐ At least 1 character from [\$#@].
- ☐ Minimum length 6 characters.
- ☐ Maximum length 16 characters.

**CODE:**

```
def isValid(str):
    if len(str)<6 or len(str)>16:
        return False
    flag1=0
    flag2=0
    flag3=0
    flag4=0
    flag5=1
    special_char = ['$','@','#']
    for char in str:
        num = ord(char)
        if num>=65 and num<=90:
            flag1=1
        elif num>=97 and num<=122:
            flag2=1
        elif num>=48 and num<=57:
            flag3=1
        elif char in special_char:
            flag4=1
        else:
            flag5=0
    if flag1 and flag2 and flag3 and flag4 and flag5:
        return True
    return False

print("Enter password : ", end = " ")
password = input()
print(password)
```

```
if isValid(password) :  
    print("Valid Password")  
else:  
    print("Invalid Password")'
```

**OUTPUT:**

```
Shell Clear  
Enter password : Kulpreet@123#  
Kulpreet@123#  
Valid Password  
> |  
Shell Clear  
Enter password : Kulpreet&32  
Kulpreet&32  
Invalid Password  
>
```

4. Create a List L that is defined as= [10, 20, 30, 40, 50, 60, 70, 80].

- (i) WAP to add 200 and 300 to L.
- (ii) WAP to remove 10 and 30 from L.
- (iii) WAP to sort L in ascending order.
- (iv) WAP to sort L in descending order.

**CODE:**

```
l = [10, 20, 30, 40, 50, 60, 70, 80]  
print(l)  
l.append(200)  
l.append(300)  
print(l)  
l.remove(10)  
l.remove(30)  
print(l)  
l.sort()  
print(l)  
l.sort(reverse=True)  
print(l)
```

**OUTPUT:**

```
Shell Clear  
[10, 20, 30, 40, 50, 60, 70, 80]  
[10, 20, 30, 40, 50, 60, 70, 80, 200, 300]  
[20, 40, 50, 60, 70, 80, 200, 300]  
[20, 40, 50, 60, 70, 80, 200, 300]  
[300, 200, 80, 70, 60, 50, 40, 20]  
> |
```

5. D is a dictionary defined as D= {1:"One", 2:"Two", 3:"Three", 4: "Four", 5:"Five"}.

- (i) WAP to add new entry in D; key=6 and value is "Six"
- (ii) WAP to remove key=2.
- (iii) WAP to check if 6 key is present in D.
- (iv) WAP to count the number of elements present in D.
- (v) WAP to add all the values present D.

**CODE:**

```
D= {1:'One', 2:'Two', 3:'Three', 4: 'Four', 5:'Five'}
print('Original dictionary')
print(D)
D[6]='Six'
print("New Key added")
print(D)
D.pop(2)
print('Key deleted')
print(D)
if 6 in D:
    print('Key 6 is present')
else:
    print('Key is absent')
print('Total keys in dictionary = {}'.format(len(D.keys())))
result=0
for key in D.keys():
    result+=key
print(f'The sum of all elements in the Dictionary is : {result}')
```

**OUTPUT:**

Shell Clear

```
Original dictionary
{1: 'One', 2: 'Two', 3: 'Three', 4: 'Four', 5: 'Five'}
New Key added
{1: 'One', 2: 'Two', 3: 'Three', 4: 'Four', 5: 'Five', 6: 'Six'}
Key deleted
{1: 'One', 3: 'Three', 4: 'Four', 5: 'Five', 6: 'Six'}
Key 6 is present
Total keys in dictionary = 5
The sum of all elements in the Dictionary is : 19
> |
```

**6. WAP to create a list of 100 random numbers between 100 and 900. Count and print the:**

- (i) All odd numbers
- (ii) All even numbers
- (iii) All prime numbers

**CODE:**

```
import random
import math
```

```
def isPrime(val):
    flag = 0
    for i in range(3,math.ceil(math.sqrt(val)),2):
        if val%i==0:
            flag = 1
            break
    if flag==0:
        return True
    return False

l = [random.randint(100,900) for i in range(100)]
odd=[]
even=[]
for num in l:
    if num%2==0:
        even.append(num)
    else:
        odd.append(num)

primes = [val for val in odd if isPrime(val)]

print('All odd numbers : ',odd)
print('Count of Odd numbers = ',len(odd))
print('All even numbers : ',even)
print('Count of even numbers = ',len(even))
print('All prime numbers : ',primes)
print('Count of prime numbers = ',len(primes))
```

**OUTPUT:**

```
Shell Clear
All odd numbers :  [757, 185, 385, 845, 471, 483, 751, 251, 893, 431, 329, 785, 751, 169, 509, 497, 457, 859
, 803, 125, 379, 651, 727, 775, 845, 193, 173, 183, 357, 823, 531, 479, 303, 109, 147, 763, 763, 497,
539, 761, 227, 869, 141, 105, 867, 211, 313, 721, 213, 167, 187, 899, 241, 223]
Count of Odd numbers =  54
All even numbers :  [878, 100, 486, 758, 714, 146, 526, 458, 334, 362, 124, 784, 498, 648, 336, 486, 670,
812, 240, 454, 518, 888, 734, 622, 398, 692, 342, 824, 544, 606, 792, 740, 398, 682, 706, 888, 200, 266,
568, 196, 234, 744, 642, 368, 856, 434]
Count of even numbers =  46
All prime numbers :  [757, 751, 251, 431, 751, 169, 509, 457, 859, 379, 727, 193, 173, 823, 479, 109, 761,
227, 211, 313, 167, 241, 223]
Count of prime numbers =  23
> |
```

**7.**

- (i) **Write a function which takes principal amount, interest rate and time. This function returns compound interest. Call this function to print the output**

- (ii) **Save this function (as a module) in a python file and call it in another python file.**

**CODE:**

*#file name: interest.py*

```
def ciCalc(p, r, t, n):  
    return p * pow((1 + r/(100 * n)), n*t)
```

*#file name: CompoundInterest.py*

```
import interest  
p = float(input("\nEnter principal amount : "))  
r = float(input("\nEnter annual rate of interest(in %) : "))  
t = float(input("\nEnter time(in years) : "))  
n = float(input("\nEnter number of times interest applied per time period : "))  
a = interest.ciCalc(p,r,t,n)  
print("\nTotal amount : ",a)  
print("\nCompound interest : ",(a-p))
```

**OUTPUT:**

```
Shell Clear  
  
Enter principal amount : 1000  
Enter annual rate of interest(in %) : 10  
Enter time(in years) : 2  
Enter number of times interest applied per time period : 1  
Total amount : 1210.0000000000002  
  
Compound interest : 210.00000000000023  
> |
```

**8.**

- A) Make a class called Restaurant. The `__init__()` method for Restaurant should store two attributes: a `restaurant_name` and a `cuisine_type`. Make a method called `describe_restaurant()` that prints these two pieces of information, and a method called `open_restaurant()` that prints a message indicating that the restaurant is open. Make an instance called `restaurant` from your class. Print the two attributes individually, and then call both methods.**

**CODE:**

```
class Restaurant:  
    def __init__(self,name,ctype):  
        self.restaurant_name = name  
        self.cuisine_type = ctype  
    def describe_restaurant(self):  
        print("Restaurant Name :",self.restaurant_name)  
        print("Cuisine type :",self.cuisine_type)  
    def open_restaurant(self):  
        print("The restaurant is OPEN")
```

```
restaurant = Restaurant("Elevate","Italian")
print(restaurant.restaurant_name)
print(restaurant.cuisine_type)
restaurant.describe_restaurant()
restaurant.open_restaurant()
```

**OUTPUT:**

Shell Clear

```
Elevate
Italian
Restaurant Name : Elevate
Cuisine type : Italian
The restaurant is OPEN
> |
```

- B) Make a class called User. Create two attributes called first\_name and last\_name, and then create several other attributes that are typically stored in a user profile. Make a method called describe\_user() that prints a summary of the user's information. Make another method called greet\_user() that prints a personalized greeting to the user. Create several instances representing different users, and call both method for each user.**

**CODE:**

```
class User:
    def __init__(self,fname,lname,roll,dob,college,degree):
        self.first_name = fname
        self.last_name = lname
        self.roll_number = roll
        self.dob = dob
        self.college_name = college
        self.degree = degree
    def describe_user(self):
        print("\nUser Profile")
        print("First Name :",self.first_name)
        print("Last Name :",self.last_name)
        print("Roll Number :",self.roll_number)
        print("Date of Birth :",self.dob)
        print("College/University :",self.college_name)
        print("Degree/Programme :",self.degree)
    def greet_user(self):
        print(f'\nHello {self.first_name}! Hope you find Python interesting. Enjoy Learning!!')

user1 = User('Kulpreet','Singh',101803186,'01 September 2000','Thapar Institute of Engineering and Technology','B.Tech(COE)')
user1.describe_user()
user1.greet_user()
```



```
user2 = User('Ayush','Jain',101803690,'15 December 2000','Thapar Institute of  
Engineering and Technology','B.Tech(COE)')  
user2.describe_user()  
user2.greet_user()
```

**OUTPUT:**

Shell

Clear

```
> User Profile  
First Name : Kulpreet  
Last Name : Singh  
Roll Number : 101803186  
Date of Birth : 01 September 2000  
College/University : Thapar Institute of Engineering and Technology  
Degree/Programme : B.Tech(COE)  
  
Hello Kulpreet! Hope you find Python interesting. Enjoy Learning!!  
  
User Profile  
First Name : Ayush  
Last Name : Jain  
Roll Number : 101803690  
Date of Birth : 15 December 2000  
College/University : Thapar Institute of Engineering and Technology  
Degree/Programme : B.Tech(COE)  
  
Hello Ayush! Hope you find Python interesting. Enjoy Learning!!  
> |
```