Python Practical (208) – Assignment-7

'''

Q.1. Consider a 4 x 4 NumPy array of your choice. Write a Python program that finds the following and display them in an appropriate format for the given NumPy array: (NOTE: DO NOT USE BUILT-IN FUNCTIONS TO FIND THE MAXIMUM, MINIMUM AND SUM)

□ Maximum, Minimum and Sum of all the elements of the matrix

□ Maximum, Minimum and Sum of all the elements of each row

□ Maximum, Minimum and Sum of all the elements of each column

□ Maximum, Minimum and Sum of all the diagonal elements.

'''

```
import numpy as np
arr = np.array([1,2,3,4,5,6,7,8,9,0,6,5,4,3,2,1])

print(arr)

arr2 = arr.reshape(4,4)
print(arr2)



print("\nMaximum, Minimum and Sum of all the elements of the matrix :\n----------------------------------------------------\n")
asum = 0
amin = arr2[0,0]
amax = arr2[0,0]
for i in range(4):
   for j in range(4):
      asum = asum + arr2[i,j]
      if(amin > arr2[i,j]):
         amin = arr2[i,j]
      if(amax < arr2[i,j]):
         amax = arr2[i,j]

print("Maximum : ",amax)
print("Minimum : ",amin)
```

```
print("Sum : ",asum)


print("\nMaximum, Minimum and Sum of all the elements of each Row :\n----------------------------------------------------
\n")


for i in range(4):
    asum = 0
    amin = arr2[i,0]
    amax = arr2[i,0]
    for j in range(4):
        asum = asum + arr2[i,j]
        if(amin > arr2[i,j]):
            amin = arr2[i,j]
        if(amax < arr2[i,j]):
            amax = arr2[i,j]
    print("Row No. : ",i+1)
    print("Maximum : ",amax)
    print("Minimum : ",amin)
    print("Sum : ",asum)


print("\nMaximum, Minimum and Sum of all the elements of each Column :\n-------------------------------------------------
-----\n")


for j in range(4):
    asum = 0
    amin = arr2[0,j]
    amax = arr2[0,j]
    for i in range(4):
        asum = asum + arr2[i,j]
        if(amin > arr2[i,j]):
            amin = arr2[i,j]
        if(amax < arr2[i,j]):
            amax = arr2[i,j]
    print("Column No. : ",j+1)
    print("Maximum : ",amax)
    print("Minimum : ",amin)
    print("Sum : ",asum)
```

```
print("\nMaximum, Minimum and Sum of all the elements of All Diagonal :\n--------------------------------------------------\n")


asum = 0
amin = arr2[0,0]
amax = arr2[0,0]
for i in range(4):
    for j in range(4):
        if(i == j):
            asum = asum + arr2[i,j]
            if(amin > arr2[i,j]):
                amin = arr2[i,j]
            if(amax < arr2[i,j]):
                amax = arr2[i,j]
print("Diagonal No. : ",1)
print("Maximum : ",amax)
print("Minimum : ",amin)
print("Sum : ",asum)

asum = 0
amin = arr2[0,0]
amax = arr2[0,0]
for i in range(4):
    for j in range(4):
        if(i == 4-j-1):
            asum = asum + arr2[i,j]
            if(amin > arr2[i,j]):
                amin = arr2[i,j]
            if(amax < arr2[i,j]):
                amax = arr2[i,j]
print("Diagonal No. : ",2)
print("Maximum : ",amax)
print("Minimum : ",amin)
print("Sum : ",asum)
```

'''

Q.2. Consider a 1-D NumPy array of 10 elements, where each element is temperature in degrees Celsius. Write a Python program to Convert it to an array containing temperature in degrees Fahrenheit. The relation between Celsius and Fahrenheit is C / 5 = (F – 32) / 9. Display them in an appropriate format.

'''

```
import numpy as np

arr = np.array([10,20,30,40,50,60,70,80,90,100])

print("In Celsius : ")
print(arr)

for i in range(10):
   arr[i] = (arr[i]*(9/5))+32

print("In Fahrenheit : ")
print(arr)
```

'''

Q.3. Consider a 4 x 3 NumPy array and a 3 x 4 NumPy array. Write a Python program to perform the Matrix Multiplication of these two NumPy arrays. DO NOT USE THE BUILT-IN OPERATOR TO FIND THE MATRIX MULTIPLICATION.

'''

```
import numpy as np

arr = np.array([1,2,3,4,5,6,7,8,9,0,1,2])
print(arr)

arr1 = arr.reshape(4,3)
arr2 = arr.reshape(3,4)
print("Array-1 : ",arr1)
print("Array-2 : ",arr2)

arr3 = np.zeros([4,4],dtype=int)
for i in range(4):
   for j in range(4):
      arr3[i,j] = 0
      for k in range(3):
         arr3[i,j] += arr1[i,k] * arr2[k,j]



print("Multiplcation : ")
print(arr3)
```

'''

Q.4. Consider a NumPy array where each row represents data of a student and there are 10 such rows. The data of a student consists of rollno, name, city and age. i.e. each row contains rollno, name, city and age of a student. Write a Python program to find the following:

□ Maximum, Minimum and Average age of all the students

□ Maximum, Minimum and Average age of all the students living in a particular city (take input of name of a city from the user)

□ Maximum, Minimum and Average age of all the students whose name starts with the letter 'A'

□ Maximum, Minimum and Average age of all the students having rollno > n (take input of n from the user)

'''

```
import numpy as np
arr = np.zeros([10,4],dtype=object)

arr[0] = np.array([1,"Chandani","Surat",21])
arr[1] = np.array([2,"Sumit","Surat",23])
arr[2] = np.array([3,"Saloni","Ahemdabad",23])
arr[3] = np.array([4,"Aakansha","Ahemdabad",21])
arr[4] = np.array([5,"Khushi","Banglore",15])
arr[5] = np.array([6,"Harendra","Surat",48])
arr[6] = np.array([7,"Seema","Surat",50])
arr[7] = np.array([8,"Vijay","Surat",21])
arr[8] = np.array([9,"Aman","Hydrabad",23])
arr[9] = np.array([10,"Shibu","Patan",27])


print(arr)

print("\nMaximum, Minimum and Average age of all the students\n-------------------------------------------------\n")
amin = 0
amax = 0
asum = 0
for i in range(10):
```

```
    if(int(arr[i,3]) < amin):
        amin = int(arr[i,3])
    if(int(arr[i,3]) > amax):
        amax = int(arr[i,3])
    asum = asum + int(arr[i,3])


print("Maximum age : ",amax)
print("Minimum age : ",amin)
print("Average age : ",asum/10)


print("\nMaximum, Minimum and Average age of all the students living in a particular city (take input of name of a city from the user)\n----------\n")


city = input("ENter City : ").strip()


amin = 0
amax = 0
asum = 0
count = 0
for i in range(10):
    if(arr[i,2] == city):
        count += 1
        if(count == 1):
            amin = int(arr[i,3])
            amax = int(arr[i,3])
        if(int(arr[i,3]) < amin):
            amin = int(arr[i,3])
        if(int(arr[i,3]) > amax):
            amax = int(arr[i,3])
        asum = asum + int(arr[i,3])

if(count != 0):
    print("Maximum age : ",amax)
    print("Minimum age : ",amin)
    print("Average age : ",asum/count)
else:
```

```
    print("No Record Found")


print("\nMaximum, Minimum and Average age of all the students whose name starts with the letter ‘A’\n----------
-----------------------------------\n")


amin = 0

amax = 0

asum = 0

count = 0

for i in range(10):

    if(arr[i,1].startswith("A")):

        count += 1

        if(count == 1):

            amin = int(arr[i,3])

            amax = int(arr[i,3])

        if(int(arr[i,3]) < amin):

            amin = int(arr[i,3])

        if(int(arr[i,3]) > amax):

            amax = int(arr[i,3])

        asum = asum + int(arr[i,3])


if(count != 0):

    print("Maximum age : ",amax)

    print("Minimum age : ",amin)

    print("Average age : ",asum/count)

else:

    print("No Record Found")



print("\nMaximum, Minimum and Average age of all the students having rollno > n (take input of n from the
user))\n-----------------------------------------------------\n")


rollno = int(input("ENter N : "))


amin = 0

amax = 0

asum = 0
```

```
count = 0
for i in range(10):
    if(int(arr[i,0]) > rollno):
        count += 1
        if(count == 1):
            amin = int(arr[i,3])
            amax = int(arr[i,3])
        if(int(arr[i,3]) < amin):
            amin = int(arr[i,3])
        if(int(arr[i,3]) > amax):
            amax = int(arr[i,3])
        asum = asum + int(arr[i,3])

if(count != 0):
    print("Maximum age : ",amax)
    print("Minimum age : ",amin)
    print("Average age : ",asum/count)
else:
    print("No Record Found")
```

'''

Q.5. Consider the NumPy array used in Q.4. Write a Python program to do the following:

□ Display details of all the students living in a particular city (take input of name

of a city from the user) in appropriate format

□ Display details of all the students having age greater than N (take input of N

from the user) in appropriate format

'''

```
import numpy as np
arr = np.zeros([10,4],dtype=object)

arr[0] = np.array([1,"Chandani","Surat",21])
arr[1] = np.array([2,"Sumit","Surat",23])
arr[2] = np.array([3,"Saloni","Ahemdabad",23])
arr[3] = np.array([4,"Aakansha","Ahemdabad",21])
arr[4] = np.array([5,"Khushi","Banglore",15])
arr[5] = np.array([6,"Harendra","Surat",48])
arr[6] = np.array([7,"Seema","Surat",50])
arr[7] = np.array([8,"Vijay","Surat",21])
arr[8] = np.array([9,"Aman","Hydrabad",23])
arr[9] = np.array([10,"Shibu","Patan",27])

print(arr)

print("\nDisplay details of all the students\n----------\n")
print("RollNo   Name    City   Age\n----------\n")
for i in range(10):
    print(arr[i,0],"   ",arr[i,1],"   ",arr[i,2],"   ",arr[i,3])

print("\nDisplay details of all the students living in a particular city (take input of name of a city from the user) in appropriate format\n----------\n")

city = input("ENter City : ").strip()
```

```
count = 0


print("RollNo   Name     City   Age\n-------------------------------------------------\n")
for i in range(10):
   if(arr[i,2] == city):
      print(arr[i,0],"   ",arr[i,1],"   ",arr[i,2],"   ",arr[i,3])
      count += 1

if(count == 0):
   print("No Record Found")



print("\nDisplay details of all the students having age greater than N (take input of N from the user) in appropriate format\n-------------------------------------------------\n")

rollno = int(input("ENter N : "))

count = 0

print("RollNo   Name     City   Age\n-------------------------------------------------\n")
for i in range(10):
   if(int(arr[i,0]) > rollno):
      print(arr[i,0],"   ",arr[i,1],"   ",arr[i,2],"   ",arr[i,3])
      count += 1

if(count == 0):
   print("No Record Found")
```