Name: Mythresh Maddina

700 number: 700741162

Video link: https://drive.google.com/file/d/1tC8zQEV8FqgvMQ-d_5EAc16zpe78lu2R/view?usp=sharing

Github link: https://github.com/MythreshM/CS5710_Assignment3

1.

a) Using NumPy create random vector of size 15 having only Integers in the range 1-20.

```
[ ]  import numpy as np
     arr=np.random.randint(1,21,size=15)
     arr
```

```
array([ 4, 13, 10, 14,  9, 14,  6, 17, 20, 13, 10, 10,  1,  1, 12])
```

i) Reshape the array to 3 by 5, we use numpy.reshape function

```
[ ]  #Reshpaing the array 3 by 5
     arr=np.reshape(arr, (3, 5))
     arr
```

```
array([[ 4, 13, 10, 14,  9],
       [14,  6, 17, 20, 13],
       [10, 10,  1,  1, 12]])
```

ii) Print array shape

```
[ ]  #print reshape
     print(arr.shape)
```

```
(3, 5)
```

iii)

```
[16] #Replace the max in each row by 0
     ma=np.amax(arr,axis=1)
     arr=np.where(np.isin(arr,ma),0,arr)
     arr
```

Create a 2-dimensional array of size 4 x 3 (composed of 4-byte integer elements), also print the shape, type and data type of the array.

```
arr2=np.array([[1, 3, 5], [7, 9, 11],[2 , 4, 6],[8,10,12]], np.int32)
print(arr2.shape)
print(type(arr2))
print(arr2.dtype)
```

```
(4, 3)
<class 'numpy.ndarray'>
int32
```

b) program to compute the eigenvalues and right eigenvectors of a given square array

```
[ ] # importing numpy library
    import numpy as np

    # create numpy 2d-array
    arr = np.array([[3, -2],
          [1, 0]])

    # finding eigenvalues and eigenvectors
    eigen_values, eigen_vectors = np.linalg.eig(arr)

    # printing eigen values
    print("Eigen values of the given square array is :\n",eigen_values)

    # printing eigen vectors
    print("Right eigenvectors of the given square array:\n"
              ,eigen_vectors)
```

```
Eigen values of the given square array is :
 [2. 1.]
Right eigenvectors of the given square array:
 [[0.89442719 0.70710678]
 [0.4472136  0.70710678]]
```

c) the sum of the diagonal element

```
# importing numpy library
import numpy as np

# create numpy 2d-array
arr = np.array([[0, 1, 2],
     [3,4,5]])
for i in range(len(arr)):
  for j in range(len(arr[i])):
    if i==j:
      s+=arr[i][j]

print(s)
```

d) NumPy program to create a new shape to an array

```
[ ]  import numpy as np

     arr=np.array([1,2,3,4,5,6])

     arr=np.reshape(arr, (3,2))

     print(" 3x2 Reshape\n",arr)

     print("\n")
     arr=np.reshape(arr, (2,3))

     print(" 2x3 Reshape\n",arr)
```

```
 3x2 Reshape
 [[1 2]
 [3 4]
 [5 6]]


 2x3 Reshape
 [[1 2 3]
 [4 5 6]]
```

2)

2. Matplotlib

```
from matplotlib import pyplot as plt
# Data to plot
languages = 'Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++'
popuratity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]
colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728", "#9467bd", "#8c564b"]
# exploding 1st slice
explode = (0.1, 0, 0, 0,0,0)
# Plot
plt.pie(popuratity, explode=explode, labels=languages, colors=colors,
autopct='%1.1f%%', shadow=True, startangle=140)

plt.axis('equal')
plt.show()
```