24-07-2023

Day 5 Assignment

In [1]:

```
import numpy as np
import pandas as pd
from numpy import linalg as la
```

1. Create 5 matrices with five different dimensions (1-D,2-D,...5-D)

In [2]:

```
data1=np.array([1,2,3,4,5])
print(data1)
```

```
[1 2 3 4 5]
```

In [3]:

```
data2=np.array([[1,2],[3,4]])
print(data2)
```

```
[[1 2]
 [3 4]]
```

In [4]:

```
data3=np.array([[1,2,3],[4,5,6],[7,8,9]])
print(data3)
```

```
[[1 2 3]
 [4 5 6]
 [7 8 9]]
```

In [5]:

```
data4=np.array([[1,2,3,4],[5,6,7,8],[9,10,11,12],[13,14,15,16]])
print(data4)
```

```
[[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]
 [13 14 15 16]]
```

In [6]:

```
data5=np.array([[1,2,3,4,5],[6,-7,8,9,10],[11,12,-13,14,15],[16,17,18,19,-20],[21,22,-23,
print(data5)
```

```
[[  1   2   3   4   5]
 [  6  -7   8   9  10]
 [ 11  12 -13  14  15]
 [ 16  17  18  19 -20]
 [ 21  22 -23  24 -25]]
```

2. Find determinants of 5 matrices and display your output

In [7]:

```
print(la.det(data2))#Data2
```

```
-2.0000000000000004
```

In [8]:

```
print(la.det(data3))#Data3
```

```
-9.51619735392994e-16
```

In [9]:

```
print(la.det(data4))#Data4
```

```
-1.820448242817726e-31
```

In [10]:

```
print(la.det(data5))#Data5
```

```
718200.0000000003
```

3. Find inverse of the above 5 matrices and display your output

In [11]:

```
print(la.inv(data2))#Data2
```

```
[[-2.   1. ]
 [ 1.5 -0.5]]
```

In [12]:

```
print(la.inv(data3))#Data3
```

```
[[ 3.15251974e+15 -6.30503948e+15  3.15251974e+15]
 [-6.30503948e+15  1.26100790e+16 -6.30503948e+15]
 [ 3.15251974e+15 -6.30503948e+15  3.15251974e+15]]
```

In [13]:

```
print(la.inv(data4))#Data4
```

```
[[ 1.50119988e+15 -3.75299969e+14 -3.75299969e+15  2.62709978e+15]
 [-1.95155984e+16  1.95155984e+16  1.95155984e+16 -1.95155984e+16]
 [ 3.45275971e+16 -3.79052969e+16 -2.77721977e+16  3.11498974e+16]
 [-1.65131986e+16  1.87649984e+16  1.20095990e+16 -1.42613988e+16]]
```

In [14]:

```
print(la.inv(data5))#Data5
```

```
[[-5.19548872e-01  4.76190476e-02  1.30325815e-01  7.46867168e-02
  -6.64160401e-02]
 [ 2.75689223e-02 -7.14285714e-02  3.84294069e-02  2.71512114e-02
  -2.17209691e-02]
 [-8.77192982e-03  1.39809459e-18  2.92397661e-03  2.92397661e-02
  -2.33918129e-02]
 [ 3.98997494e-01  2.38095238e-02 -1.04427736e-01 -5.85630744e-02
   7.35171261e-02]
 [-2.10526316e-02  3.22422120e-18  4.03508772e-02  3.50877193e-03
  -2.28070175e-02]]
```

4. Find the rank, diagonal and trace of the 5 matrices

In [15]:

```
print(la.matrix_rank(data1))#Rank(Data1)
```

```
1
```

In [16]:

```
print(la.matrix_rank(data2))#Rank(Data2)
```

```
2
```

In [17]:

```
print(la.matrix_rank(data3))#Rank(Data3)
```

```
2
```

In [18]:

```
print(la.matrix_rank(data4))#Rank(Data4)
```

```
2
```

In [19]:

```
print(la.matrix_rank(data5))#Rank(Data5)
```

```
5
```

In [20]:

```
print(np.diag(data1))#Diagonal(Data1)
```

```
[[1 0 0 0 0]
 [0 2 0 0 0]
 [0 0 3 0 0]
 [0 0 0 4 0]
 [0 0 0 0 5]]
```

In [21]:

```
print(np.diag(data2))#Diagonal(Data2)
```

```
[1 4]
```

In [22]:

```
print(np.diag(data3))#Diagonal(Data3)
```

```
[1 5 9]
```

In [23]:

```
print(np.diag(data4))#Diagonal(Data4)
```

```
[ 1  6 11 16]
```

In [24]:

```
print(np.diag(data5))#Diagonal(Data5)
```

```
[  1  -7 -13  19 -25]
```

In [25]:

```
print(np.trace(data2))#Trace=Sum of diagonal elements(Data2)
```

```
5
```

In [26]:

```
print(np.trace(data3))#Trace=Sum of diagonal elements(Data3)
```

```
15
```

In [27]:

```
print(np.trace(data4))#Trace=Sum of diagonal elements(Data4)
```

```
34
```

In [28]:

```
print(np.trace(data5))#Trace=Sum of diagonal elements(Data5)
```

```
-25
```

5. Find Eigen value and eigen vector for 5 matrices

In [29]:

```
print("Root:",la.eigvals(data2))#Data2
```

```
Root: [-0.37228132  5.37228132]
```

In [30]:

```
x,y=la.eig(data2)
print("Root:",x)
print("Matrix:",y)#Data2
```

```
Root: [-0.37228132  5.37228132]
Matrix: [[-0.82456484 -0.41597356]
 [ 0.56576746 -0.90937671]]
```

In [31]:

```
print("Root:",la.eigvals(data3))#Data3
```

```
Root: [ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]
```

In [32]:

```
x,y=la.eig(data3)
print("Root:",x)
print("Matrix:",y)#Data3
```

```
Root: [ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]
Matrix: [[-0.23197069 -0.78583024  0.40824829]
 [-0.52532209 -0.08675134 -0.81649658]
 [-0.8186735   0.61232756  0.40824829]]
```

In [33]:

```
print("Root:",la.eigvals(data4))#Data4
```

```
Root: [ 3.62093727e+01 -2.20937271e+00 -2.57831463e-15  5.57979826e-17]
```

In [34]:

```
x,y=la.eig(data4)
print("Root:",x)
print("Matrix:",y)#Data4
```

```
Root: [ 3.62093727e+01 -2.20937271e+00 -2.57831463e-15  5.57979826e-17]
Matrix: [[-0.15115432  0.72704996  0.51747505 -0.06588506]
 [-0.34923733  0.28320876 -0.82375673 -0.31743721]
 [-0.54732033 -0.16063243  0.09508831  0.83252961]
 [-0.74540333 -0.60447363  0.21119337 -0.44920733]]
```

In [35]:

```
print("Root:",la.eigvals(data5))#Data5
```

```
Root: [ 34.11233497 +0.j         -22.32272765+21.21497654j
 -22.32272765-21.21497654j  -1.74502388 +0.j
 -12.72185578 +0.j        ]
```

In [37]:

```
x,y=la.eig(data5)
print("Root:",x)
print("Matrix:",y)#Data5
```

```
Root: [ 34.11233497 +0.j         -22.32272765+21.21497654j
 -22.32272765-21.21497654j  -1.74502388 +0.j
 -12.72185578 +0.j        ]
Matrix: [[-0.19853147+0.j          0.08751952+0.07767256j  0.08751952-0.07
767256j
   0.79148667+0.j         -0.05185877+0.j        ]
 [-0.35406435+0.j          0.17279695+0.23448493j  0.17279695-0.23448493j
  -0.01260208+0.j         -0.76671732+0.j        ]
 [-0.45410569+0.j          0.07811375+0.44832564j  0.07811375-0.44832564j
   0.04420894+0.j         -0.19729341+0.j        ]
 [-0.72558826+0.j         -0.23443875-0.44218957j -0.23443875+0.44218957j
  -0.60867023+0.j          0.60271901+0.j        ]
 [-0.32020836+0.j         -0.66623911+0.j         -0.66623911-0.j
   0.03092169+0.j          0.08520747+0.j        ]]
```