HEAMNATH

20104028

1. Create 5 matrices with five different dimensions (1-D,2-D,...5-D)
2. Find determinants of 5 matrices and display your output
3. Find inverse of the above 5 matrices and display your output
4. Find the rank, diagonal and trace of the 5 matrices
5. Find Eigen value and eigen vector for 5 matrices

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]:
```
A=np.array([[1,2,3,4,5],[2,3,4,5,7],[6,4,3,2,2],[1,2,3,5,7],[1,3,6,7,3]])
A4=np.array([[1,2,3,4],[2,3,4,5],[6,4,3,2],[1,2,3,5]])
A3=np.array([[1,2,3],[2,3,4],[6,4,3]])
A2=np.array([[1,2],[2,3]])
A1=np.array([1])
print(A)
```

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

In [3]:
```
print(A4)
```

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

In [4]:
```
print(A3)
```

```
[[1 2 3]
 [2 3 4]
 [6 4 3]]
```

In [5]:
```
print(A2)
```

```
[[1 2]
```

In [6]:
```
print(A1)
```

```
[1]
```

2. Find determinants of 5 matrices and display your output

In [7]:
```
print(la.det(A))
```

```
-3.0000000000000075
```

In [8]:
```
print(la.det(A4))
```

```
-0.9999999999999991
```

In [9]:
```
print(la.det(A3))
```

```
-0.9999999999999987
```

In [10]:
```
print(la.det(A2))
```

```
-1.0
```

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

In [11]:
```
print(la.inv(A))
```

```
[[-18.           9.          -0.66666667   3.33333333   1.66666667]
 [ 46.         -24.           2.33333333  -7.66666667  -4.33333333]
 [-28.          16.          -1.66666667   3.33333333   2.66666667]
 [  9.          -6.           0.66666667  -0.33333333  -0.66666667]
 [ -5.           3.          -0.33333333   0.66666667   0.33333333]]
```

In [12]:
```
print(la.inv(A4))
```

```
[[ 7.00000000e+00 -6.00000000e+00  1.00000000e+00 -1.33226763e-15]
 [-1.90000000e+01  1.50000000e+01 -2.00000000e+00  1.00000000e+00]
 [ 1.20000000e+01 -8.00000000e+00  1.00000000e+00 -2.00000000e+00]
 [-1.00000000e+00  0.00000000e+00  0.00000000e+00  1.00000000e+00]]
```

In [13]:
```
print(la.inv(A3))
```

```
[[  7.  -6.   1.]
 [-18.  15.  -2.]
 [ 10.  -8.   1.]]
```

In [14]:
```
print(la.inv(A2))
```

```
[[-3.  2.]
 [ 2. -1.]]
```

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

In [15]:
```
print(la.matrix_rank(A))
```

```
5
```

In [16]:
```
print(la.matrix_rank(A4))
```

```
4
```

In [17]:
```
print(la.matrix_rank(A3))
```

```
3
```

In [18]:
```
print(la.matrix_rank(A2))
```

```
2
```

In [19]:
```
print(la.matrix_rank(A1))
```

```
1
```

In [20]:
```
print(np.diag(A))
```

```
[1 3 3 5 3]
```

In [21]:
```
print(np.diag(A1))
```

```
[[1]]
```

In [22]:
```
print(np.diag(A4))
```

```
[1 3 3 5]
```

In [23]:
```
print(np.diag(A3))
```

```
[1 3 3]
```

In [24]:
```
print(np.diag(A2))
```

```
[1 3]
```

In [25]:
```
print(np.trace(A))
```

```
15
```

In [26]:
```
print(np.trace(A4))
```

```
12
```

In [27]:
```
print(np.trace(A3))
```

```
7
```

In [28]:
```
print(np.trace(A2))
```

```
4
```

5. Find Eigen value and eigen vector for 5 matrices

In [29]:
```
a,b=la.eig(A)
print(a)
print(b)
```

```
[18.39596064+0.j         -2.16482025+1.68809045j -2.16482025-1.68809045j
  0.95630829+0.j         -0.02262843+0.j        ]
[[-0.37057944+0.j          -0.23919828+0.10054227j -0.23919828-0.10054227j
   0.10017736+0.j           0.29960941+0.j        ]
 [-0.51757944+0.j          -0.32010693+0.18332922j -0.32010693-0.18332922j
  -0.0771733 +0.j          -0.78708529+0.j        ]
 [-0.39993999+0.j           0.5986576 +0.j          0.5986576 -0.j
  -0.73308735+0.j           0.50131822+0.j        ]
 [-0.44755869+0.j          -0.37238996+0.27368916j -0.37238996-0.27368916j
   0.66535219+0.j          -0.17536187+0.j        ]
 [-0.48427433+0.j           0.1842192 -0.43668033j  0.1842192 +0.43668033j
  -0.06243541+0.j           0.09305486+0.j        ]]
```

In [30]:
```
a,b=la.eig(A4)
print(a)
print(b)
```

```
[12.48725313 -1.66593833  1.13638437  0.04230083]
[[-0.40066628 -0.36508396 -0.07398371  0.32491064]
 [-0.55890534 -0.3219175   0.05486796 -0.82367467]
 [-0.58085411  0.84322887  0.78198925  0.46452897]
 [-0.43554548 -0.22814007 -0.61644848 -0.01435105]]
```

In [31]:
```
a,b=la.eig(A3)
print(a)
print(b)
```

```
[ 9.42823208 -2.4711531   0.04292102]
[[-0.39221155 -0.44485792  0.33303337]
 [-0.57086468 -0.41689538 -0.83013387]
```

```
 [-0.72130688  0.79265357  0.44717617]]
```

In [32]:
```
a,b=la.eig(A2)
print(a)
print(b)
```

```
[-0.23606798  4.23606798]
[[-0.85065081 -0.52573111]
 [ 0.52573111 -0.85065081]]
```

In [33]:
```
la.eigvals(A)
```

Out[33]:
```
array([18.39596064+0.j        , -2.16482025+1.68809045j,
       -2.16482025-1.68809045j,  0.95630829+0.j        ,
       -0.02262843+0.j        ])
```

In [34]:
```
la.eigvals(A4)
```

Out[34]:
```
array([12.48725313, -1.66593833,  1.13638437,  0.04230083])
```

In [35]:
```
la.eigvals(A3)
```

Out[35]:
```
array([ 9.42823208, -2.4711531 ,  0.04292102])
```

In [36]:
```
la.eigvals(A2)
```

Out[36]:
```
array([-0.23606798,  4.23606798])
```