Importing Libraries

In [2]:
```
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 [26]:
```
a=np.array([5,6,7,8,9])
print(a)
```

```
[5 6 7 8 9]
```

In [27]:
```
b=np.array([[5,6],[7,8]])
print(b)
```

```
[[5 6]
 [7 8]]
```

In [28]:
```
c=np.array([[[5,6,1],[7,8,2],[1,2,3]]])
print(c)
```

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

In [29]:
```
d=np.array([[[[5,6,1,2],[7,8,3,4],[1,2,7,3],[4,1,8,2]]]])
print(d)
```

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

In [30]:
```
e=np.array([[[[[5,6,1,2,5],[7,8,3,4,2],[1,2,7,3,7],[4,1,8,2,3],[1,5,9,2,5]]]]])
print(e)
```

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

2. Find determinants of 5 matrices and display your output

In [31]:
```
print(la.det(b))
```

```
-1.999999999999999
```

In [32]:
```
print(la.det(c))
```

```
[-8.]
```

In [33]:
```
print(la.det(d))
```

```
[[140.]]
```

In [34]:
```
print(la.det(e))
```

```
[[[-3880.]]]
```

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

In [36]:
```
print(la.inv(b))
```

```
[[-4.   3. ]
 [ 3.5 -2.5]]
```

In [37]:
```
print(la.inv(c))
```

```
[[[-2.5    2.    -0.5  ]
  [ 2.375 -1.75   0.375]
  [-0.75   0.5    0.25 ]]]
```

In [38]:
```
print(la.inv(d))
```

```
[[[[-0.33571429  0.30714286 -0.32857143  0.21428571]
   [ 0.85714286 -0.57142857  0.28571429 -0.14285714]
   [ 0.42142857 -0.36428571  0.15714286  0.07142857]
   [-1.44285714  1.12857143 -0.11428571 -0.14285714]]]]
```

In [39]:
```
print(la.inv(e))
```

```
[[[[[ 0.14123711 -0.0435567  -0.10412371  0.20025773 -0.09819588]
    [ 0.03092784  0.03608247 -0.10309278 -0.1185567   0.17010309]
    [-0.05051546 -0.01726804 -0.06494845  0.08530928  0.09716495]
    [-0.35876289  0.3314433   0.39587629 -0.17474227 -0.22319588]
    [ 0.17525773 -0.12886598  0.08247423 -0.00515464 -0.03608247]]]]]
```

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

In [55]:
```
print(la.matrix_rank(a))
print(np.diag(a))
```

```
1
[[5 0 0 0 0]
 [0 6 0 0 0]
 [0 0 7 0 0]
 [0 0 0 8 0]
 [0 0 0 0 9]]
```

In [43]:
```
print(la.matrix_rank(b))
print(np.diag(b))
print(np.trace(b))
```

```
2
[5 8]
13
```

In [50]:
```
print(la.matrix_rank(c))
print(np.trace(c))
```

```
[3]
[5 6 1]
```

In [52]:
```
print(la.matrix_rank(d))
print(np.trace(d))
```

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

In [53]:
```
print(la.matrix_rank(e))
print(np.trace(e))
```

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

5. Find Eigen value and eigen vector for 5 matrices

In [57]:
```
print(la.eig(b))
print()
print(la.eigvals(b))
```

```
(array([-0.15206735, 13.15206735]), array([[-0.75868086, -0.59276441],
       [ 0.65146248, -0.80537591]]))

[-0.15206735 13.15206735]
```

In [58]:
```
print(la.eig(c))
print()
print(la.eigvals(c))
```

```
(array([[13.60463783, -0.2244563 ,  2.61981847]]), array([[[-0.57580285, -0.7
2543112, -0.22052115],
        [-0.79182373,  0.66267238, -0.07460738],
        [-0.20363263, -0.1860511 ,  0.97252463]]]))

[[13.60463783 -0.2244563   2.61981847]]
```

In [59]:
```
print(la.eig(d))
print()
print(la.eigvals(d))
```

```
(array([[[16.17054088+0.j        , -0.66226664+0.87840591j,
         -0.66226664-0.87840591j,  7.15399241+0.j        ]]]), array([[[[-0.4
8280226+0.j        , -0.02436092-0.24863522j,
          -0.02436092+0.24863522j, -0.4774419 +0.j        ],
         [-0.71876154+0.j        ,  0.30058037+0.23076716j,
           0.30058037-0.23076716j, -0.43027091+0.j        ],
         [-0.33186838+0.j        ,  0.25839498+0.00183713j,
           0.25839498-0.00183713j,  0.59966728+0.j        ],
         [-0.37436239+0.j        , -0.85276825+0.j        ,
          -0.85276825-0.j        ,  0.47677597+0.j        ]]]]))

[[[16.17054088+0.j         -0.66226664+0.87840591j
   -0.66226664-0.87840591j  7.15399241+0.j        ]]]
```

In [60]:
```
print(la.eig(e))
print()
print(la.eigvals(e))
```

```
(array([[[[20.88140581+0.j        ,  8.6082192 +0.j        ,
           0.25498399+2.67040617j,  0.25498399-2.67040617j,
          -2.999593  +0.j        ]]]]), array([[[[[ 0.42119154+0.j        ,
0.47748579+0.j        ,
           -0.14519257+0.41900078j, -0.14519257-0.41900078j,
           -0.34665961+0.j        ],
          [ 0.51918044+0.j        ,  0.65678228+0.j        ,
           -0.01778321-0.41571251j, -0.01778321+0.41571251j,
           -0.00086572+0.j        ],
          [ 0.42784253+0.j        , -0.4549081 +0.j        ,
            0.05531769+0.07378908j,  0.05531769-0.07378908j,
           -0.42954032+0.j        ],
          [ 0.37419691+0.j        , -0.27282618+0.j        ,
            0.70302478+0.j        ,  0.70302478-0.j        ,
            0.76300394+0.j        ],
          [ 0.47955896+0.j        , -0.24345196+0.j        ,
           -0.35692584+0.00891949j, -0.35692584-0.00891949j,
            0.33637251+0.j        ]]]]]))

[[[[20.88140581+0.j          8.6082192 +0.j
     0.25498399+2.67040617j  0.25498399-2.67040617j
    -2.999593  +0.j        ]]]]
```

In [ ]:
```
```