In [1]:
```
import numpy as np
import pandas as pd
from numpy import linalg as la
```

1. Creation of arrays(1-D, 2-D ..... 5-D)

In [11]:
```
A5=np.array([[1,2,3,4,5],[6,7,8,9,10],[11,12,13,14,15],[16,17,18,19,20],[21,22,
print(A5)
```

```
[[ 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]]
```

In [12]:
```
A4=np.array([[1,2,3,4],[5,6,7,8],[9,10,11,12],[13,14,15,16]])
print(A4)
```

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

In [13]:
```
A3=np.array([[2,3,4],[5,6,7],[2,6,9]])
print(A3)
```

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

In [14]:
```
A2=np.array([[2,3],[6,7]])
print(A2)
```

```
[[2 3]
 [6 7]]
```

In [25]:
```
A=np.array([[1]])
print(A)
```

```
[[1]]
```

2. Determinant of those arrays

In [26]:
```
print(la.det(A))
print(la.det(A2))
print(la.det(A3))
print(la.det(A4))
print(la.det(A5))
```

```
1.0
-4.000000000000002
3.000000000000009
4.7331654313261276e-30
0.0
```

3. Inverse of those matrix

In [40]:
```
print(la.inv(A))
print(la.inv(A2))
print(la.inv(A3))
print(la.inv(A4))
```

```
[[1.]]
[[-1.75  0.75]
 [ 1.5  -0.5 ]]
[[  4.          -1.          -1.        ]
 [-10.33333333   3.33333333   2.        ]
 [  6.          -2.          -1.        ]]
[[ 3.94064967e+15 -4.50359963e+15 -2.81474977e+15  3.37769972e+15]
 [-4.12829966e+15  4.50359963e+15  3.37769972e+15 -3.75299969e+15]
 [-3.56534971e+15  4.50359963e+15  1.68884986e+15 -2.62709978e+15]
 [ 3.75299969e+15 -4.50359963e+15 -2.25179981e+15  3.00239975e+15]]
```

4. Rank, diagonal and trace of the 5 matrices

In [31]:
```
print(la.matrix_rank(A))
print(la.matrix_rank(A2))
print(la.matrix_rank(A3))
print(la.matrix_rank(A4))
print(la.matrix_rank(A5))
```

```
1
2
3
2
2
```

In [42]:
```
print(np.diag(A))
print(np.diag(A2))
print(np.diag(A3))
print(np.diag(A4))
print(np.diag(A5))
```

```
[1]
[2 7]
[2 6 9]
[ 1  6 11 16]
[ 1  7 13 19 25]
```

In [44]:
```
print(np.trace(A))
print(np.trace(A2))
print(np.trace(A3))
print(np.trace(A4))
print(np.trace(A5))
```

```
1
9
17
34
65
```

5. Eigen value and eigen vector for 5 matrices

In [32]:
```
print(la.eig(A))
print(la.eig(A2))
print(la.eig(A3))
print(la.eig(A4))
print(la.eig(A5))
```

```
(array([1.]), array([[1.]]))
(array([-0.4244289,  9.4244289]), array([[-0.77776982, -0.37464267],
       [ 0.62854921, -0.92716928]]))
(array([15.81024968,  0.18975032,  1.        ]), array([[-0.33804238, -0.2524
2994, -0.06085806],
       [-0.65470355,  0.82546691, -0.79115481],
       [-0.67608477, -0.50485988,  0.60858062]]))
(array([ 3.62093727e+01, -2.20937271e+00, -3.36399340e-15, -2.27991821e-16]),
array([[-0.15115432,  0.72704996,  0.50279479, -0.10141287],
       [-0.34923733,  0.28320876, -0.83232136, -0.26597234],
       [-0.54732033, -0.16063243,  0.15625837,  0.83618329],
       [-0.74540333, -0.60447363,  0.17326821, -0.46879808]]))
(array([ 6.86420807e+01, -3.64208074e+00, -2.74904167e-15, -2.12798147e-15,
        8.18309662e-16]), array([[-0.10797496,  0.67495283, -0.03262008,  0.1
0935722, -0.02645084],
       [-0.25277499,  0.3603897 , -0.32374283,  0.23121421, -0.27585356],
       [-0.39757502,  0.04582657,  0.18215364, -0.19693179,  0.75630393],
       [-0.54237506, -0.26873656,  0.73740154, -0.73720794, -0.57924382],
       [-0.68717509, -0.58329969, -0.56319227,  0.59356829,  0.12524429]]))
```

In [35]:
```
x,y=la.eig(A)
print("Root",x)
print("Matrix",y)
x2,y2=la.eig(A2)
print("Root",x2)
print("Matrix",y2)
x3,y3=la.eig(A3)
print("Root",x3)
print("Matrix",y3)
x4,y4=la.eig(A4)
print("Root",x4)
print("Matrix",y4)
x5,y5=la.eig(A5)
print("Root",x5)
print("Matrix",y5)
```

```
Root [1.]
Matrix [[1.]]
Root [-0.4244289  9.4244289]
Matrix [[-0.77776982 -0.37464267]
 [ 0.62854921 -0.92716928]]
Root [15.81024968  0.18975032  1.        ]
Matrix [[-0.33804238 -0.25242994 -0.06085806]
 [-0.65470355  0.82546691 -0.79115481]
 [-0.67608477 -0.50485988  0.60858062]]
Root [ 3.62093727e+01 -2.20937271e+00 -3.36399340e-15 -2.27991821e-16]
Matrix [[-0.15115432  0.72704996  0.50279479 -0.10141287]
 [-0.34923733  0.28320876 -0.83232136 -0.26597234]
 [-0.54732033 -0.16063243  0.15625837  0.83618329]
 [-0.74540333 -0.60447363  0.17326821 -0.46879808]]
Root [ 6.86420807e+01 -3.64208074e+00 -2.74904167e-15 -2.12798147e-15
  8.18309662e-16]
Matrix [[-0.10797496  0.67495283 -0.03262008  0.10935722 -0.02645084]
 [-0.25277499  0.3603897  -0.32374283  0.23121421 -0.27585356]
 [-0.39757502  0.04582657  0.18215364 -0.19693179  0.75630393]
 [-0.54237506 -0.26873656  0.73740154 -0.73720794 -0.57924382]
 [-0.68717509 -0.58329969 -0.56319227  0.59356829  0.12524429]]
```

In [38]:
```
print(la.eigvals(A))
print(la.eigvals(A2))
print(la.eigvals(A3))
print(la.eigvals(A4))
print(la.eigvals(A5))
```

```
[1.]
[-0.4244289  9.4244289]
[15.81024968  0.18975032  1.        ]
[ 3.62093727e+01 -2.20937271e+00 -3.36399340e-15 -2.27991821e-16]
[ 6.86420807e+01 -3.64208074e+00 -2.74904167e-15 -2.12798147e-15
  8.18309662e-16]
```

In [ ]: