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

```
1.Dimensions of matrices
```

In [5]:
```
a1=np.array([[1]])
a2=np.array([[1,2],[2,3]])
a3=np.array([[2,3,4],[3,6,4],[7,8,9]])
a4=np.array([[8,9,0,1],[8,5,4,2],[1,5,7,2],[7,4,2,1]])
a5=np.array([[4,8,9,0,1],[9,3,5,7,1],[9,6,4,3,1],[4,7,2,3,5],[6,8,2,4,7]])
print(a1)
print(a2)
print(a3)
print(a4)
print(a5)
```

```
[[1]]
[[1 2]
 [2 3]]
[[2 3 4]
 [3 6 4]
 [7 8 9]]
[[8 9 0 1]
 [8 5 4 2]
 [1 5 7 2]
 [7 4 2 1]]
[[4 8 9 0 1]
 [9 3 5 7 1]
 [9 6 4 3 1]
 [4 7 2 3 5]
 [6 8 2 4 7]]
```

```
2.Determinants
```

In [6]:
```
print(la.det(a1))
print(la.det(a2))
print(la.det(a3))
print(la.det(a4))
print(la.det(a5))
```

```
1.0
-1.0
-24.999999999999996
123.00000000000006
2275.0
```

```
3.Inverese
```

In [8]:
```
print(la.inv(a1))
print(la.inv(a2))
print(la.inv(a3))
print(la.inv(a4))
print(la.inv(a5))
```

```
[[1.]]
[[-3.  2.]
 [ 2. -1.]]
[[-0.88 -0.2   0.48]
 [-0.04  0.4  -0.16]
 [ 0.72 -0.2  -0.12]]
[[-0.07317073 -0.07317073 -0.04878049  0.31707317]
 [ 0.14634146 -0.18699187  0.09756098  0.03252033]
 [-0.17073171 -0.50406504  0.2195122   0.7398374 ]
 [ 0.26829268  2.26829268 -0.48780488 -2.82926829]]
[[-0.00923077 -0.05054945  0.16       -0.4821978   0.33010989]
 [-0.06461538 -0.06813187  0.12        0.76747253 -0.54637363]
 [ 0.16307692  0.08351648 -0.16       -0.38593407  0.2632967 ]
 [-0.08923077  0.17802198 -0.12        0.67208791 -0.4756044 ]
 [ 0.08615385 -0.0043956  -0.16       -0.73758242  0.68087912]]
```

4.Rank

In [9]:
```
print(la.matrix_rank(a1))
print(la.matrix_rank(a2))
print(la.matrix_rank(a3))
print(la.matrix_rank(a4))
print(la.matrix_rank(a5))
```

```
1
2
3
4
5
```

Diagonal

In [10]:
```
print(np.diag(a1))
print(np.diag(a2))
print(np.diag(a3))
print(np.diag(a4))
print(np.diag(a5))
```

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

```
Trace
```

In [11]:
```
print(np.trace(a1))
print(np.trace(a2))
print(np.trace(a3))
print(np.trace(a4))
print(np.trace(a5))
```

```
1
4
17
21
21
```

5.eigen value

In [12]:
```
print(la.eig(a1))
print(la.eig(a2))
print(la.eig(a3))
print(la.eig(a4))
print(la.eig(a5))
```

```
(array([1.]), array([[1.]]))
(array([-0.23606798,  4.23606798]), array([[-0.85065081, -0.52573111],
       [ 0.52573111, -0.85065081]]))
(array([15.96215758, -0.83587897,  1.87372139]), array([[-0.33318576, -0.8276
0653,  0.30079526],
       [-0.43600375,  0.03540978, -0.76748487],
       [-0.8359952 ,  0.56019066,  0.56611765]]))
(array([17.55264827,  6.67653172, -2.86252049, -0.3666595 ]), array([[ 0.5772
8516,  0.40392287, -0.5216152 , -0.11929957],
       [ 0.5650159 , -0.07363499,  0.57034275,  0.00407328],
       [ 0.40381168, -0.9027765 , -0.344338  , -0.24760551],
       [ 0.42945896,  0.12813583,  0.53297099,  0.96147935]]))
(array([23.31934231,  6.81043047, -6.91053454, -2.9273532 ,  0.70811497]), ar
ray([[-0.41262768, -0.35603996, -0.6920076 , -0.29391449,  0.35407071],
       [-0.45380231,  0.03831833,  0.6316514 , -0.52376043, -0.47859114],
       [-0.42388448, -0.22637678,  0.28277569,  0.65345549,  0.23568579],
       [-0.40879663,  0.53600486, -0.19968478,  0.3053475 , -0.54431235],
       [-0.52631656,  0.73021887, -0.04801957,  0.34503349,  0.54199698]]))
```

```
eigen vector
```

In [15]:
```
x,y=la.eig(a1)
print(x)
print(y)
x2,y2=la.eig(a2)
print(x2)
print(y2)
x3,y3=la.eig(a3)
print(x3)
print(y3)
x4,y4=la.eig(a4)
print(x4)
print(y4)
x5,y5=la.eig(a5)
print(x5)
print(y5)
```

```
[1.]
[[1.]]
[-0.23606798  4.23606798]
[[-0.85065081 -0.52573111]
 [ 0.52573111 -0.85065081]]
[15.96215758 -0.83587897  1.87372139]
[[-0.33318576 -0.82760653  0.30079526]
 [-0.43600375  0.03540978 -0.76748487]
 [-0.8359952   0.56019066  0.56611765]]
[17.55264827  6.67653172 -2.86252049 -0.3666595 ]
[[ 0.57728516  0.40392287 -0.5216152  -0.11929957]
 [ 0.5650159  -0.07363499  0.57034275  0.00407328]
 [ 0.40381168 -0.9027765  -0.344338   -0.24760551]
 [ 0.42945896  0.12813583  0.53297099  0.96147935]]
[23.31934231  6.81043047 -6.91053454 -2.9273532   0.70811497]
[[-0.41262768 -0.35603996 -0.6920076  -0.29391449  0.35407071]
 [-0.45380231  0.03831833  0.6316514  -0.52376043 -0.47859114]
 [-0.42388448 -0.22637678  0.28277569  0.65345549  0.23568579]
 [-0.40879663  0.53600486 -0.19968478  0.3053475  -0.54431235]
 [-0.52631656  0.73021887 -0.04801957  0.34503349  0.54199698]]
```

In [ ]:
```
```