

MK 24-07-23

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

```
In [6]: import numpy as np
import pandas as pd
from numpy import linalg as la
```

```
In [8]: M1 = np.array([1])
M2 = np.array([[1, 2], [3, 4]])
M3 = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
M4 = np.array([[1, 2, 3, 4], [5, 6, 7, 8], [9, 10, 11, 12], [13, 14, 15, 16]])
M5 = 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, 24, 25]])
print(M1)
print(M2)
print(M3)
print(M4)
print(M5)
```

```
[1]
[[1 2]
 [3 4]]
[[1 2 3]
 [4 5 6]
 [7 8 9]]
[[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]
 [13 14 15 16]]
[[ 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.The determinants of the 5 matrices

```
In [14]: print(np.linalg.det(M2))
print(np.linalg.det(M3))
print(np.linalg.det(M4))
print(np.linalg.det(M5))
```

```
-2.0000000000000004
-9.51619735392994e-16
-1.820448242817726e-31
0.0
```

Find inverse of the above 5 matrices and display your output

In [18]:

```

print(np.linalg.inv(M2))
print(np.linalg.inv(M3))
print(np.linalg.inv(M4))

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

```

Find the rank, diagonal and trace of the 5 matrices

In [31]:

```

print(np.linalg.matrix_rank(M1))
print(np.linalg.matrix_rank(M2))
print(np.linalg.matrix_rank(M3))
print(np.linalg.matrix_rank(M4))
print(np.linalg.matrix_rank(M5))

print( np.diagonal(M2))
print( np.diagonal(M3))
print( np.diagonal(M4))
print( np.diagonal(M5))
print( np.trace(M2))
print( np.trace(M3))
print( np.trace(M4))
print( np.trace(M5))

```

```

1
2
2
2
2
[1 4]
[1 5 9]
[ 1  6 11 16]
[ 1  7 13 19 25]
5
15
34
65

```

Find Eigen value and eigen vector for 5 matrices

In [28]:

```

print( np.linalg.eigvals(M2))
print( np.linalg.eig(M2))
print( np.linalg.eigvals(M3))
print( np.linalg.eig(M3))
print( np.linalg.eigvals(M4))
print( np.linalg.eig(M4))
print( np.linalg.eigvals(M5))
print( np.linalg.eig(M5))

[-0.37228132  5.37228132]
(array([-0.37228132,  5.37228132]), array([[ -0.82456484, -0.41597356],
      [ 0.56576746, -0.90937671]]))
[ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]
(array([ 1.61168440e+01, -1.11684397e+00, -3.38433605e-16]), array([[ -0.23197
069, -0.78583024,  0.40824829],
      [-0.52532209, -0.08675134, -0.81649658],
      [-0.8186735 ,  0.61232756,  0.40824829]]))
[ 3.62093727e+01 -2.20937271e+00 -2.57831463e-15  5.57979826e-17]
(array([ 3.62093727e+01, -2.20937271e+00, -2.57831463e-15,  5.57979826e-17]),
array([[ -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]]))
[ 6.86420807e+01+0.00000000e+00j -3.64208074e+00+0.00000000e+00j
 -1.04866446e-15+0.00000000e+00j  1.34082976e-16+1.19171295e-15j
 1.34082976e-16-1.19171295e-15j]
(array([ 6.86420807e+01+0.00000000e+00j, -3.64208074e+00+0.00000000e+00j,
      -1.04866446e-15+0.00000000e+00j,  1.34082976e-16+1.19171295e-15j,
      1.34082976e-16-1.19171295e-15j]), array([[ -0.10797496+0.j
0.67495283+0.j
      ,
      0.02031966+0.j
      , -0.24674761-0.00953463j,
      -0.24674761+0.00953463j],
      [-0.25277499+0.j
      , 0.3603897 +0.j
      , 0.1802646 +0.j
      , 0.08248136+0.28769623j,
      0.08248136-0.28769623j],
      [-0.39757502+0.j
      , 0.04582657+0.j
      , 0.10205537+0.j
      , 0.05755382-0.41247509j,
      0.05755382+0.41247509j],
      [-0.54237506+0.j
      , -0.26873656+0.j
      , -0.82618318+0.j
      , 0.62443868+0.j
      , 0.62443868-0.j
      ],
      [-0.68717509+0.j
      , -0.58329969+0.j
      , 0.52354355+0.j
      , -0.51772627+0.13431349j,
      -0.51772627-0.13431349j]]))

```

In []: