24/07/2023

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

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

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

```
[[1]]
[[1 2]
 [2 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]
 [ 5  6  7  8  9]
 [11 12 13 14 15]
 [16 17 18 19 20]
 [21 22 23 24 25]]
```

Find determinants of 5 matrices and display your output

In [8]:
```
print(np.linalg.det(b))
print(np.linalg.det(c))
print(np.linalg.det(d))
print(np.linalg.det(e))
```

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

Find inverse of the above 5 matrices and display your output

In [11]:
```
print(np.linalg.inv(c))
print(np.linalg.inv(d))
```

```
[[ 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 matrice

In [28]:
```
print(np.linalg.matrix_rank(a))
print(np.linalg.matrix_rank(b))
print(np.linalg.matrix_rank(c))
print(np.linalg.matrix_rank(d))
print(np.linalg.matrix_rank(e))
```

```
1
1
2
2
2
```

In [25]:
```
print(np.diagonal(a))
print(np.diagonal(b))
print(np.diagonal(c))
print(np.diagonal(d))
print(np.diagonal(e))
```

```
[1]
[1 4]
[1 5 9]
[ 1  6 11 16]
[ 1  6 13 19 25]
```

In [27]:
```
print(np.trace(a))
print(np.trace(b))
print(np.trace(c))
print(np.trace(d))
print(np.trace(e))
```

```
1
5
15
34
64
```

Find Eigen value and eigen vector for 5 matrices

In [31]:
```
print(np.linalg.eigvals(b))
print(np.linalg.eigvals(c))
print(np.linalg.eigvals(d))
print(np.linalg.eigvals(e))
```

```
[0. 5.]
[ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]
[ 3.62093727e+01 -2.20937271e+00 -2.57831463e-15  5.57979826e-17]
[ 6.77631095e+01+0.00000000e+00j -3.76310948e+00+0.00000000e+00j
  9.07515908e-16+1.08887195e-15j  9.07515908e-16-1.08887195e-15j
 -4.53813160e-16+0.00000000e+00j]
```