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 [4]:
```
a=np.array([1,2,3,4,5])
print(a)
```

```
[1 2 3 4 5]
```

In [5]:
```
b=np.array([[1,2],[5,6]])
print(b)
```

```
[[1 2]
 [5 6]]
```

In [19]:
```
c=np.array([[[1,2,3],[4,5,6],[7,8,9]]])
print(c)
```

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

In [21]:
```
d=np.array([[[[1,2,3],[4,5,6],[7,8,9],[10,11,12]]]])
print(d)
```

```
[[[[ 1  2  3]
   [ 4  5  6]
   [ 7  8  9]
   [10 11 12]]]]
```

In [17]:
```
e=np.array([[[[[1,2,3],[4,5,6],[10,20,30],[40,50,60],[70,80,90]]]]])
print(e)
```

```
[[[[[ 1  2  3]
    [ 4  5  6]
    [10 20 30]
    [40 50 60]
    [70 80 90]]]]]
```

2. Find determinants of 5 matrices and display your output

In [22]:
```
print(la.det(b))
```

```
-3.999999999999999
```

In [23]:
```
print(la.det(c))
```

```
[-9.51619735e-16]
```

In [27]:
```
z=np.array([[6,7],[10,20]])
print(la.det(z))
```

```
50.000000000000014
```

In [28]:
```
q=np.array([[4,5],[70,80]])
print(la.det(q))
```

```
-30.000000000000014
```

In [30]:
```
w=np.array([[1,2,3],[100,200,300],[7,8,9]])
print(la.det(w))
```

```
-1.2490009027033008e-14
```

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

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

```
[[-1.5   0.5 ]
 [ 1.25 -0.25]]
```

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

```
[[[ 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]]]
```

In [33]:
```
print(la.inv(z))
```

```
[[ 0.4  -0.14]
 [-0.2   0.12]]
```

In [34]:
```
print(la.inv(q))
```

```
[[-2.66666667  0.16666667]
 [ 2.33333333 -0.13333333]]
```

In [35]:
```
print(la.inv(w))
```

```
[[ 4.80383960e+16 -4.80383960e+14 -1.77635684e-17]
 [-9.60767921e+16  9.60767921e+14  5.00000000e-01]
 [ 4.80383960e+16 -4.80383960e+14 -3.33333333e-01]]
```

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

In [37]:
```
print(la.matrix_rank(b))
print(np.diag(b))
print(np.trace(b))
```

```
2
[1 6]
7
```

In [40]:
```
print(la.matrix_rank(z))
print(np.diag(z))
print(np.trace(z))
```

```
2
[ 6 20]
26
```

In [41]:
```
print(la.matrix_rank(q))
print(np.diag(q))
print(np.trace(q))
```

```
2
[ 4 80]
84
```

In [42]:
```
print(la.matrix_rank(w))
print(np.diag(w))
print(np.trace(w))
```

```
2
[  1 200   9]
210
```

5. Find Eigen value and eigen vector for 5 matrices

In [47]:
```
print(la.eig(b))
print()
print(la.eigvals(b))
```

```
(array([-0.53112887,  7.53112887]), array([[-0.79402877, -0.2928046 ],
       [ 0.60788018, -0.9561723 ]]))

[-0.53112887  7.53112887]
```

In [48]:
```
print(la.eig(c))
print()
print(la.eigvals(c))
```

```
(array([[ 1.61168440e+01, -1.11684397e+00, -3.38433605e-16]]), array([[[-0.23197069, -0.78583024,  0.4082482
9],
        [-0.52532209, -0.08675134, -0.81649658],
        [-0.8186735 ,  0.61232756,  0.40824829]]]))

[[ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]]
```

In [49]:
```
print(la.eig(z))
print()
print(la.eigvals(z))
```

```
(array([ 2.09128789, 23.90871211]), array([[-0.87310557, -0.36404948],
       [ 0.48753119, -0.93137961]]))

[ 2.09128789 23.90871211]
```

In [50]:
```
print(la.eig(q))
print()
print(la.eigvals(q))
```

```
(array([-0.35563717, 84.35563717]), array([[-0.75402196, -0.06210328],
       [ 0.65684921, -0.99806973]]))

[-0.35563717 84.35563717]
```

In [51]:
```
print(la.eig(w))
print()
print(la.eigvals(w))
```

```
(array([ 2.12874928e+02,  1.19042031e-15, -2.87492758e+00]), array([[-0.00999168, -0.40824829, -0.00827059],
       [-0.99916763,  0.81649658, -0.82705852],
       [-0.03955014, -0.40824829,  0.56205498]]))

[ 2.12874928e+02  1.19042031e-15 -2.87492758e+00]
```

In [ ]: