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

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

In [23]:
```
a=np.array([1])
b=np.array([[1,2],[3,4]])
c=np.array([[1,2,3,],[4,5,6],[7,9,9]])
d=np.array([[1,2,3,4],[5,6,7,8],[9,10,11,12],[13,10,15,16]])
e=np.array([[1,2,3,4,5],[6,7,8,9,10],[11,11,13,14,15],[16,17,18,14,20],[21,22,2
print(a)
print(b)
print(c)
print(d)
print(e)
```

```
[1]
[[1 2]
 [3 4]]
[[1 2 3]
 [4 5 6]
 [7 9 9]]
[[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]
 [13 10 15 16]]
[[ 1  2  3  4  5]
 [ 6  7  8  9 10]
 [11 11 13 14 15]
 [16 17 18 14 20]
 [21 22 23 24 25]]
```

2. Find determinants of 5 matrices and display your output

In [24]:
```
la.det(b)
```

Out[24]: -2.0000000000000004

In [26]:
```
la.det(c)
```

Out[26]: 5.999999999999998

In [27]:
```
la.det(d)
```

Out[27]: -1.4210854715202048e-14

In [28]:
```
la.det(e)
```

Out[28]:
```
1.2833076511720374e-28
```

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

In [29]:
```
la.inv(b)
```

Out[29]:
```
array([[-2. ,  1. ],
       [ 1.5, -0.5]])
```

In [30]:
```
la.inv(c)
```

Out[30]:
```
array([[-1.5       ,  1.5       , -0.5       ],
       [ 1.        , -2.        ,  1.        ],
       [ 0.16666667,  0.83333333, -0.5       ]])
```

In [31]:
```
la.inv(d)
```

Out[31]:
```
array([[-1.12589991e+15,  2.25179981e+15, -1.12589991e+15,
         -3.12500000e-02],
       [-3.06250000e-01,  2.37500000e-01,  2.43750000e-01,
         -2.50000000e-01],
       [ 3.37769972e+15, -6.75539944e+15,  3.37769972e+15,
          5.93750000e-01],
       [-2.25179981e+15,  4.50359963e+15, -2.25179981e+15,
         -3.12500000e-01]])
```

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

In [39]:
```
print(la.matrix_rank(a))
```

```
1
```

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

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

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

```
3
[1 5 9]
15
```

In [43]:
```
print(la.matrix_rank(d))
print(np.diag(d))
print(np.trace(d))
```

```
3
[ 1  6 11 16]
34
```

In [44]:
```
print(la.matrix_rank(e))
print(np.diag(e))
print(np.trace(e))
```

```
4
[ 1  7 13 14 25]
60
```

5. Find Eigen value and eigen vector for 5 matrices

In [45]:
```
print(la.eigvals(b))
print(la.eigvals(c))
print(la.eigvals(d))
print(la.eigvals(e))
```

```
[-0.37228132  5.37228132]
[16.47853607 -1.16635961 -0.31217646]
[ 3.53328756e+01 -1.82825167e+00  4.95376062e-01  3.18999142e-15]
[ 6.71972812e+01 -4.39575994e+00 -3.02532737e+00 -5.93441928e-15
  2.23806116e-01]
```

In [46]:
```
x,y=la.eig(b)
print(x)
print(y)
```

```
[-0.37228132  5.37228132]
[[-0.82456484 -0.41597356]
 [ 0.56576746 -0.90937671]]
```

In [47]:
```
x,y=la.eig(c)
print(x)
print(y)
```

```
[16.47853607 -1.16635961 -0.31217646]
[[-0.22673793 -0.76619824  0.67923965]
 [-0.51207    -0.11767616 -0.71209481]
 [-0.82847705  0.63173775  0.17763578]]
```

In [48]:
```
x,y=la.eig(d)
print(x)
print(y)
```

```
[ 3.53328756e+01 -1.82825167e+00  4.95376062e-01  3.18999142e-15]
[[-1.54935544e-01 -8.04992792e-01  2.62736350e-01 -2.67261242e-01]
 [-3.59319323e-01 -2.28794726e-01 -2.24212158e-01  1.44891659e-15]
 [-5.63703103e-01  3.47403341e-01 -7.11160665e-01  8.01783726e-01]
 [-7.27408697e-01  4.23025409e-01  6.12330815e-01 -5.34522484e-01]]
```

In [49]:
```
x,y=la.eig(e)
print(x)
print(y)
```

```
[ 6.71972812e+01 -4.39575994e+00 -3.02532737e+00 -5.93441928e-15
  2.23806116e-01]
[[-1.10249878e-01  3.52609794e-01 -2.84825966e-01  4.08248290e-01
  -2.23313912e-01]
 [-2.58245046e-01  2.74279392e-01 -4.61375520e-02 -7.65876719e-15
  -2.59625647e-01]
 [-4.02397126e-01  2.58345343e-01  1.77300429e-01 -8.16496581e-01
   8.64109768e-01]
 [-5.15851984e-01 -8.55658384e-01 -6.60686720e-01 -1.11586488e-15
  -1.42347137e-02]
 [-7.02230549e-01  3.92881843e-02  6.69927691e-01  4.08248290e-01
  -3.68560852e-01]]
```

In [ ]:
```

```