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

In [3]:

```
import numpy as np
import pandas as pd
from numpy import linalg as la
```

In [8]:

```
a=np.array([1])
b=np.array([[1,2],[3,4]])
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],[6,7,8,9,10],[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]
 [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. Find determinants of 5 matrices and display your output

In [9]:

```
la.det(b)
```

Out[9]:

```
-2.0000000000000004
```

In [10]:

```
la.det(c)
```

Out[10]:

```
-9.51619735392994e-16
```

In [11]:

```
la.det(d)
```

Out[11]:

```
-1.820448242817726e-31
```

```
In [12]: la.det(e)

Out[12]: 0.0
```

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

```
In [22]: la.inv(b)

Out[22]: array([[-2. ,  1. ],
                [ 1.5, -0.5]])
```

```
In [23]: la.inv(c)

Out[23]: array([[ 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 [24]: la.inv(d)

Out[24]: array([[ 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]])
```

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

```
In [19]: la.matrix_rank(a)

Out[19]: 1
```

```
In [20]: la.matrix_rank(b)
         np.diag(b)
         np.trace(b)

Out[20]: 5
```

```
In [26]: la.matrix_rank(c)
         np.diag(c)
         np.trace(c)

Out[26]: 15
```

```
In [27]: la.matrix_rank(d)
         np.diag(d)
         np.trace(d)

Out[27]: 34
```

```
In [28]: la.matrix_rank(e)
         np.diag(e)
         np.trace(e)

Out[28]: 65
```

5. Find Eigen value and eigen vector for 5 matrices

```
In [31]: la.eigvals(b)
         la.eigvals(c)
         la.eigvals(d)
         la.eigvals(e)

Out[31]: 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])
```

```
In [30]: x,y=la.eig(b)
         print(x)
         print(y)

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

```
In [32]: x,y=la.eig(c)
         print(x)
         print(y)

         [ 1.61168440e+01 -1.11684397e+00 -3.38433605e-16]
         [[-0.23197069 -0.78583024  0.40824829]
          [-0.52532209 -0.08675134 -0.81649658]
          [-0.8186735   0.61232756  0.40824829]]
```

```
In [33]: x,y=la.eig(d)
         print(x)
         print(y)

         [ 3.62093727e+01 -2.20937271e+00 -2.57831463e-15  5.57979826e-17]
         [[-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]]
```

In [34]:
```
x,y=la.eig(e)
print(x)
print(y)
```

```
[ 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]
[[-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 [ ]: