```
In [1]: a = [1,2,3,4]
        print("a=",a)
```

```
a= [1, 2, 3, 4]
```

```
In [3]: import numpy as np
        a = np.array([[1],[2],[3],[4]])
        print("a=",a)
```

```
a= [[1]
 [2]
 [3]
 [4]]
```

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

```
a= [[1]
 [2]
 [3]
 [4]]
```

```
In [7]: ## Writing a matrix
        A= np.array([[1,2,3,4],
                     [5,6,7,8],
                     [9,10,11,12]])

        B= np.array([[13,14,15,16],
                     [17,18,19,20],
                     [21,22,23,24]])
        print("B=",B)
        print("A=",A)
```

```
B= [[13 14 15 16]
 [17 18 19 20]
 [21 22 23 24]]
A= [[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]]
```

```
In [ ]:
```

In [8]:
```python
## Sum
S= A+B
print("S",S)
```

```
S [[14 16 18 20]
 [22 24 26 28]
 [30 32 34 36]]
```

In [9]:
```python
C = A-B
print("C",C)
```

```
C [[-12 -12 -12 -12]
 [-12 -12 -12 -12]
 [-12 -12 -12 -12]]
```

In [10]:
```python
V = A *B
print("V",V)
```

```
V [[ 13  28  45  64]
 [ 85 108 133 160]
 [189 220 253 288]]
```

In [17]:
```python
import numpy as np
A= np.array([[1,2,3,4],
             [5,6,7,8],
             [9,10,11,12]])

B= np.array([[13,14,15,16],
             [17,18,19,20],
              [21,22,23,24]])
BT = np.transpose(B)
print(BT)
## Matrix Multiplication 3x4 and 3x4
N=np.matmul(A,BT)
print("A*BT=",N)
```

```
[[13 17 21]
 [14 18 22]
 [15 19 23]
 [16 20 24]]
A*BT= [[150 190 230]
 [382 486 590]
 [614 782 950]]
```

```python
import numpy.linalg as la
## Determinants
W = np.array([[1,2],
              [3,4]])
T = np.array([[5,6,7],
              [8,9,10],
              [11,12,13]])
Wdet= la.det(W)
print(Wdet)
Tdet= la.det(T)
print(Tdet)
```

In [22]:

```
-2.0000000000000004
-1.0658141036401509e-14
```

In [23]:

```python
## Inverses
##It seems that W and T have inverses,since the determinants are not
Winv = la.inv(W)
print(Winv)
Tinv = la.inv(T)
print(Tinv)
```

```
[[-2.   1. ]
 [ 1.5 -0.5]]
[[ 2.81474977e+14 -5.62949953e+14  2.81474977e+14]
 [-5.62949953e+14  1.12589991e+15 -5.62949953e+14]
 [ 2.81474977e+14 -5.62949953e+14  2.81474977e+14]]
```

In [27]:

```python
## Eigenvalues and Eigenvectors
Weig,x= la.eig(W)
#print(Weig)
print(x)
```

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

In [35]:

```python
import numpy as np
import numpy.linalg as la
## Solving a system,x+2y=5,and 3x+4y=6
A = np.array([[1,2],
              [3,4]])
b = np.array([[5],
              [6]])
Ainv = la.inv(A)
x =np.matmul(Ainv,b)
print(x)
```

```
[[-4. ]
 [ 4.5]]
```

In [40]:
```python
## Solving a system,x+2y=5,2x+4y=6,and 3x+4y=7
A = np.array([[1,2],
              [2,4],
              [3,4]])
b = np.array([[5],
              [6],
              [7]])
##Find the least square,The 0 is for precision
x= np.linalg.lstsq(A,b,rcond=None)[0]
print(x)
```

```
[[0.2]
 [1.6]]
```

In [ ]: