In [2]:
```
import numpy as np
```

In [3]:
```
ar=np.array([[10,20,30],[30,40,50]])
print(ar)
```
```
[[10 20 30]
 [30 40 50]]
```

In [4]:
```
sliced=ar[:1:,1:]
print(sliced)
```
```
[[20 30]]
```

In [5]:
```
indexed=ar[[0,1],[1,1]]
print(indexed)
```
```
[20 40]
```

In [6]:
```
#sum
print(ar.sum())
```
```
180
```

In [8]:
```
#sqrt
print(np.sqrt(ar))
```
```
[[3.16227766 4.47213595 5.47722558]
 [5.47722558 6.32455532 7.07106781]]
```

In [9]:
```
#add element in array
print(ar+10)
```
```
[[20 30 40]
 [40 50 60]]
```

In [11]:
```
m1=np.array([[1,2,3],[2,4,5],[1,2,4]])
m2=np.array([[2,4,3],[2,3,4],[12,3,4]])

m3=np.dot(m1,m2)
print(m3)
```
```
[[42 19 23]
 [72 35 42]
 [54 22 27]]
```

In [12]:
```
#transpose

print(m3.T)
```
```
[[42 72 54]
 [19 35 22]
 [23 42 27]]
```

In [13]:
```
bol=np.array([[True,True],[False,False]])
print(np.all(bol))
```
```
False
```

In [15]:
```
bol=np.array([[True,True],[True,True]])
print(np.all(bol))
```
```
True
```

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```
se]])
print(np.all(bol,axis=1))
```

```
[ True False]
```

In [19]:

```
bol=np.array([[True,True],[False,False]])
print(np.all(bol ,axis=0))
```

```
[False False]
```

In [22]:

```
bol=np.array([[True,True],[False,False]])
print(np.any(bol))
```

```
True
```

In [24]:

```
bol=np.array([[True,True],[False,False]])
print(np.all(bol,axis=1))
```

```
[ True False]
```

In [33]:

```
bol=np.array([[True,True],[False,False]])
print(np.any(bol,axis=1))
```

```
[ True False]
```

In [28]:

```
bol=np.array([[True,True],[False,False]])
print(np.any(bol,axis=0))
```

```
[ True  True]
```

In [34]:

```
#arrang
ar=np.arange(8)
print(ar)
```

```
[0 1 2 3 4 5 6 7]
```

In [36]:

```
#reshape

print(ar.reshape(2,4))
```

```
[[0 1 2 3]
 [4 5 6 7]]
```

In [38]:

```
#merge vstack
vstack=np.vstack((m1,m2,m3))
print(vstack)
```

```
[[ 1  2  3]
 [ 2  4  5]
 [ 1  2  4]
 [ 2  4  3]
 [ 2  3  4]
 [12  3  4]
 [42 19 23]
 [72 35 42]
 [54 22 27]]
```

In [40]:

```
#merge vstack
hstack=np.hstack((m1,m2,m3))
print(hstack)
```

```
[[ 1  2  3  2  4  3 42 19 23]
 [ 2  4  5  2  3  4 72 35 42]
 [ 1  2  4 12  3  4 54 22 27]]
```

In [43]:

```
#merge vstack
vspilt=np.vsplit(vstack,3)
print(vspilt)
```

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```
[array([[1, 2, 3],
       [2, 4, 5],
       [1, 2, 4]]), array([[ 2,  4,  3],
       [ 2,  3,  4],
       [12,  3,  4]]), array([[42, 19, 23],
       [72, 35, 42],
       [54, 22, 27]])]
```

In [46]:

```
#merge vstack
vspilt=np.hsplit(vstack,3)
print(vspilt)
```

```
[array([[ 1],
       [ 2],
       [ 1],
       [ 2],
       [ 2],
       [12],
       [42],
       [72],
       [54]]), array([[ 2],
       [ 4],
       [ 2],
       [ 4],
       [ 3],
       [ 3],
       [19],
       [35],
       [22]]), array([[ 3],
       [ 5],
       [ 4],
       [ 3],
       [ 4],
       [ 4],
       [23],
       [42],
       [27]])]
```

In [48]:

```
#mathematical function

ar=np.array([2,3,4])
print('sqrt',np.sqrt(ar))
print('exp',np.exp(ar))
print('sin',np.sin(ar))
print('cos',np.cos(ar))
print('log',np.log(ar))
print('sum',np.sum(ar))
print('std',np.std(ar))
```

```
sqrt [1.41421356 1.73205081 2.        ]
exp [ 7.3890561  20.08553692 54.59815003]
sin [ 0.90929743  0.14112001 -0.7568025 ]
cos [-0.41614684 -0.9899925  -0.65364362]
log [0.69314718 1.09861229 1.38629436]
sum 9
std 0.816496580927726
```

In [50]:

```
#random

print(np.random.random(20))
```

```
[0.25307227 0.80361877 0.19629769 0.68291409 0.11676941 0.10048159
 0.32262335 0.09494979 0.68541417 0.20808645 0.46120245 0.76300922
                                  78587071 0.3195576  0.71824927
 0.83339088 0.28082042]
```

In [52]:

```
print(np.random.rand(3,4))
```

```
[[0.22909051 0.33731792 0.61215631 0.9445971 ]
 [0.93869652 0.97007567 0.01743006 0.02739277]
 [0.83621435 0.30782178 0.84020046 0.5556991 ]]
```

In [54]:

```
print(np.random.randint(0,100,20))
```

```
[75 56 35 50 18 59 66 21 89 88 54 21 38  0 23 51  5 80 72 33]
```

In [57]:

```
#permitution
print(np.random.permutation(np.arange(5)))
```

```
[1 0 4 2 3]
```