

```
import numpy as np
```

```
arr1=np.empty((2,3))
arr2=np.array([[10,2,3],[23,45,67]])
```

```
print(arr2)
```

```
↔ [[10  2  3]
    [23 45 67]]
```

```
arr3=np.ones((2,3))
print(arr3)
```

```
↔ [[1.  1.  1.]
    [1.  1.  1.]]
```

```
arr4=np.zeros((2,3),dtype=int)
print(arr4)
```

```
↔ [[0 0 0]
    [0 0 0]]
```

```
np.random.random((2,2))
```

```
↔ array([[0.49258584, 0.4444419 ],
         [0.26251619, 0.1238045 ]])
```

```
var2=np.empty(4)
var2[0]=5.67
var2[1]=2
var2[2]=56
var2[3]=304
print(var2)
```

```
↔ [5.67000000e+00 2.00000000e+00 3.04000000e+02 1.23804495e-01]
```

```
print(var2.shape)
```

```
↔ (4,)
```

```
print(var2.size)
```

```
↔ 4
```

```
var3=np.empty((2,3))
var3[0][0]=5.67
var3[0][1]=2
var3[0][2]=56
var3[1][0]=0.09
var3[1][1]=132
var3[1][2]=1056
print(var3)
```

```
↔ [[5.670e+00 2.000e+00 5.600e+01]
    [9.000e-02 1.320e+02 1.056e+03]]
```

```
print(var3.shape)
```

```
↔ (2, 3)
```

```
var3=np.empty((2,3),dtype=int)
var3[0][0]=5.67
var3[0][1]=2
var3[0][2]=56
var3[1][0]=0.09
var3[1][1]=132
var3[1][2]=1056
print(var3)
```

```
↔ [[ 5  2 56]
    [ 0 132 1056]]
```

```
print(var3[1])
```

```
↔ [  0 132 1056]
```

```
print(var3[[0,1]])
```

```
↔ [[  5   2  56]
    [  0 132 1056]]
```

```
print(var3[:,2])
```

```
↔ [ 56 1056]
```

```
print(var3[:,[1,2]])
```

```
↔ [[  2  56]
    [132 1056]]
```

```
print(var3[1][2])
```

```
↔ 1056
```

```
print(var3[1,2])
```

```
↔ 1056
```

```
print(np.transpose(var3))
```

```
↔ [[  5   0]
    [  2 132]
    [ 56 1056]]
```

```
print(var3.reshape(3,2))
```

```
↔ [[  5   2]
    [ 56   0]
    [132 1056]]
```

```
arr1=np.empty((2,3),dtype=int)
arr1[0][0]=5.67
arr1[0][1]=2
arr1[0][2]=56
arr1[1][0]=0.09
arr1[1][1]=132
arr1[1][2]=1056
print(arr1)
```

```
↔ [[  5   2  56]
    [  0 132 1056]]
```

```
arr2=np.empty((1,3),dtype=int)
arr2[0][0]=37
arr2[0][1]=2.193
arr2[0][2]=5609
print(arr2)
```

```
↔ [[ 37   2 5609]]
```

```
arr_concat=np.concatenate((arr1,arr2),axis=0)
print(arr_concat)
```

```
↔ [[  5   2  56]
    [  0 132 1056]
    [ 37   2 5609]]
```

```
print(arr2.min())
```

```
↔ 2
```

```
arr2.max()
```

```
↔ 5609
```

```
arr2.cumsum()
```

```
↕ array([ 37,  39, 5648])
```

```
arr2.mean()
```

```
↕ 1882.6666666666667
```

```
arr2.std()
```

```
↕ 2634.9543112210163
```

```
from numpy import pi
```

```
array1=np.array([30,60,90])  
np.sin(array1*np.pi/180)
```

```
↕ array([0.5      , 0.8660254, 1.      ])
```

```
arr2=np.array([67.07,88.10,34,231.67,0.934])  
print(arr2)
```

```
↕ [ 67.07  88.1   34.   231.67   0.934]
```

```
np.around(arr2)
```

```
↕ array([ 67.,  88.,  34., 232.,   1.]
```

```
np.around(arr2,decimals=2)
```

```
↕ array([ 67.07, 88.1 ,  34.  , 231.67,   0.93])
```

```
np.floor(arr2)
```

```
↕ array([ 67.,  88.,  34., 231.,   0.]
```

```
np.ceil(arr2)
```

```
↕ array([ 68.,  89.,  34., 232.,   1.]
```

```
arr2=np.arange(6,dtype=int).reshape(2,3)
```

```
arr2
```

```
↕ array([[0, 1, 2],  
        [3, 4, 5]])
```

```
np.add(arr1,arr2)
```

```
↕ array([[ 5,  3, 58],  
        [ 3, 136, 1061]])
```

```
np.subtract(arr1,arr2)
```

```
↕ array([[ 5,  1, 54],  
        [-3, 128, 1051]])
```

```
np.multiply(arr1,arr2)
```

```
↕ array([[ 0,  2, 112],  
        [ 0, 528, 5280]])
```

```
np.divide(arr2,arr1)
```

```
↕ <ipython-input-41-6a0bd0e0205e>:1: RuntimeWarning: divide by zero encountered in divide  
  np.divide(arr2,arr1)  
  array([[0.      , 0.5      , 0.03571429],  
        [ inf, 0.03030303, 0.00473485]])
```

```
np.power(arr1,2)
```

```
↕ array([[ 25,  4, 3136],  
        [ 0, 17424, 1115136]])
```

```
np.mod(arr2,arr1)
```

```
<ipython-input-43-acd918db7191>:1: RuntimeWarning: divide by zero encountered in remainder
np.mod(arr2,arr1)
array([[0, 1, 2],
       [0, 4, 5]])
```

```
np.remainder(arr2,arr1)
```

```
<ipython-input-44-3e2449219b99>:1: RuntimeWarning: divide by zero encountered in remainder
np.remainder(arr2,arr1)
array([[0, 1, 2],
       [0, 4, 5]])
```

```
a=np.array([[21,7,14],[19,40,8]])
```

```
a
```

```
array([[21,  7, 14],
       [19, 40,  8]])
```

```
np.sort(a)
```

```
array([[ 7, 14, 21],
       [ 8, 19, 40]])
```

```
np.sort(a,axis=0)
```

```
array([[19,  7,  8],
       [21, 40, 14]])
```

```
np.sort(a,axis=1)
```

```
array([[ 7, 14, 21],
       [ 8, 19, 40]])
```

```
np.where(a>13)
```

```
(array([0, 0, 1, 1]), array([0, 2, 0, 1]))
```

```
print(a[np.where(a>13)])
```

```
[21 14 19 40]
```

```
np.mean(a)
```

```
18.166666666666668
```

```
np.mean(a,axis=1)
```

```
array([14.          , 22.33333333])
```

```
np.mean(a,axis=0)
```

```
array([20. , 23.5, 11. ])
```

```
np.median(a)
```

```
16.5
```

```
np.median(a,axis=1)
```

```
array([14., 19.])
```

```
np.median(a,axis=0)
```

```
array([20. , 23.5, 11. ])
```

```
np.std(a)
```

```
11.036555420762202
```

```
np.var(a)
```

```
121.80555555555554
```