

DAY11

```
a=range(10)
```

```
b=range(10)
```

```
%%timeit
```

```
[i*j for i in a for j in b]
```

```
13.3 micro seconds
```

```
import numpy as np
```

```
a=np.arange(10)
```

```
b=np.arange(10)
```

```
%%timeit
```

```
a*b
```

```
1.06 micro seconds
```

```
import numpy as np
```

```
np.array([1,2,3])
```

```
array([1, 2, 3])
```

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

```
np.array(a)
```

```
array([1, 2, 3])
```

```
np.array([[1,2,3],[4,5,6]])
```

```
array([[1, 2, 3],
```

```
       [4, 5, 6]])
```

```
np.array([a,a])
```

```
array([[1, 2, 3],
```

```
       [1, 2, 3]])
```

```
np.ones(3)
```

```
array([1., 1., 1.])
```

```
np.ones((2,3))
```

```
array([[1., 1., 1.],  
       [1., 1., 1.]])
```

np.zeros((2,3))

```
array([[0., 0., 0.],  
       [0., 0., 0.]])
```

np.eye(3)

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

np.arange(5)

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

np.arange(20)

```
array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,  
       17, 18, 19])
```

np.arange(10,20)

```
array([10, 11, 12, 13, 14, 15, 16, 17, 18, 19])
```

np.arange(-10,20)

```
array([-10, -9, -8, -7, -6, -5, -4, -3, -2, -1,  0,  1,  2,  
       3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15,  
       16, 17, 18, 19])
```

np.arange(-10,20,2)

```
array([-10, -8, -6, -4, -2,  0,  2,  4,  6,  8, 10, 12, 14,  
       16, 18])
```

np.linspace(-10,20,6)

```
array([-10., -4.,  2.,  8., 14., 20.])
```

np.random.rand(3,5)

```
array([[0.73102923, 0.0303528 , 0.66259503, 0.84220751, 0.56192569],  
       [0.17849515, 0.68590993, 0.33697108, 0.25443495, 0.4363625 ],  
       [0.41516698, 0.57445953, 0.15313014, 0.91228677, 0.8463072 ]])
```

np.random.rand(10)

```
array([0.43442823, 0.74789368, 0.667253 , 0.75394012, 0.35359892,  
      0.40288368, 0.61608068, 0.36187804, 0.11390846, 0.27927315])
```

```
np.random.randint(-20,20,5)
```

```
array([-9, -7, -14, -5, -12])
```

```
np.random.randint(-20,20,5)
```

```
array([ 5, 17, -17, -11, -20])
```

```
np.random.randn(5,3)
```

```
array([[ -1.26258983, -0.83363043, -0.00888469],  
      [ -0.43864741,  0.72475585, -0.80647603],  
      [ -1.1966616 , -1.22901924, -0.75357054],  
      [  0.51762224,  1.04771865, -0.660926 ],  
      [  1.28906108,  1.14609898,  0.07897511]])
```

```
a=np.arange(9)
```

```
a
```

```
array([0, 1, 2, 3, 4, 5, 6, 7, 8])
```

```
a+5
```

```
array([ 5,  6,  7,  8,  9, 10, 11, 12, 13])
```

```
a*5
```

```
array([ 0,  5, 10, 15, 20, 25, 30, 35, 40])
```

```
a%5
```

```
array([0, 1, 2, 3, 4, 0, 1, 2, 3], dtype=int32)
```

```
a>5
```

```
array([False, False, False, False, False, False,  True,  True,  True])
```

```
a=np.random.randn(5,3)
```

```
a
```

```
array([[ 0.78851956, -0.43813942, -1.62930183],  
      [ 1.59286494, -0.54102053,  0.6323279 ],  
      [-0.23474506,  1.60926879,  0.67123307],  
      [ 0.11381504,  1.46491461,  0.16430581],  
      [-0.42959706,  0.45998477, -0.78011169]])
```

a+5

```
array([[5.78851956, 4.56186058, 3.37069817],  
       [6.59286494, 4.45897947, 5.6323279 ],  
       [4.76525494, 6.60926879, 5.67123307],  
       [5.11381504, 6.46491461, 5.16430581],  
       [4.57040294, 5.45998477, 4.21988831]])
```

a>2

```
array([[False, False, False],  
       [False, False, False],  
       [False, False, False],  
       [False, False, False],  
       [False, False, False]])
```

a

```
array([[ 0.78851956, -0.43813942, -1.62930183],  
       [ 1.59286494, -0.54102053,  0.6323279 ],  
       [-0.23474506,  1.60926879,  0.67123307],  
       [ 0.11381504,  1.46491461,  0.16430581],  
       [-0.42959706,  0.45998477, -0.78011169]])
```

a=np.arange(10)

a

```
array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
```

a[3]

3

a[-1]

9

a[2:5]

```
array([2, 3, 4])
```

a[3:]

```
array([3, 4, 5, 6, 7, 8, 9])
```

a=np.random.randn(5,3)

a

```
array([[ 0.7832338 , 0.58711426, 0.73483773],
       [-0.78625161, -1.52426528, 0.65547527],
       [ 0.19597301, 0.09927799, -0.28260604],
       [-0.72423439, -0.68333885, 1.35138747],
       [-2.53640952, -1.65270907, -0.93349909]])
```

a[:,1:]

```
array([[ 0.58711426, 0.73483773],
       [-1.52426528, 0.65547527],
       [ 0.09927799, -0.28260604],
       [-0.68333885, 1.35138747],
       [-1.65270907, -0.93349909]])
```

a[:,2:]

```
array([[ 0.7832338 , 0.58711426, 0.73483773],
       [-0.78625161, -1.52426528, 0.65547527]])
```

a[2:5,:2]

```
array([[ 0.19597301, 0.09927799],
       [-0.72423439, -0.68333885],
       [-2.53640952, -1.65270907]])
```

a

```
array([[ 0.7832338 , 0.58711426, 0.73483773],
       [-0.78625161, -1.52426528, 0.65547527],
       [ 0.19597301, 0.09927799, -0.28260604],
       [-0.72423439, -0.68333885, 1.35138747],
       [-2.53640952, -1.65270907, -0.93349909]])
```

a=np.arange(20)

a

```
array([ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19])
```

a.size

20

b=np.random.randn(5,3)

b.size

15

a.shape

(20,)

b.shape

(5, 3)

a.sum()

190

b.sum()

1.0540974558058336

a.mean()

9.5

b.mean()

0.0702731637203889

a.reshape(4,5)

```
array([[ 0,  1,  2,  3,  4],
       [ 5,  6,  7,  8,  9],
       [10, 11, 12, 13, 14],
       [15, 16, 17, 18, 19]])
```

a.reshape(3,5)

Traceback (most recent call last):

File "<pyshell#56>", line 1, in <module>

a.reshape(3,5)

ValueError: cannot reshape array of size 20 into shape (3,5)

b

```
array([[ 1.04091421, -1.52013975, -0.14735663],
       [ 0.05536842,  2.40136847, -1.51949314],
       [ 0.33910885, -0.90184621, -0.65856255],
```

```
[-0.0748325 , -0.60145595, -1.10174562],  
 [ 0.8781207 , 2.3663261 , 0.49832306]])
```

b.reshape(3,5)

```
array([[ 1.04091421, -1.52013975, -0.14735663,  0.05536842,  2.40136847],  
       [-1.51949314,  0.33910885, -0.90184621, -0.65856255, -0.0748325 ],  
       [-0.60145595, -1.10174562,  0.8781207 ,  2.3663261 ,  0.49832306]])
```

a=np.arange(9)

a=a.reshape(3,3)

a

```
array([[0, 1, 2],  
       [3, 4, 5],  
       [6, 7, 8]])
```

np.sin(a)

```
array([[ 0.          ,  0.84147098,  0.90929743],  
       [ 0.14112001, -0.7568025 , -0.95892427],  
       [-0.2794155 ,  0.6569866 ,  0.98935825]])
```

np.cos(a)

```
array([[ 1.          ,  0.54030231, -0.41614684],  
       [-0.9899925 , -0.65364362,  0.28366219],  
       [ 0.96017029,  0.75390225, -0.14550003]])
```

np.tan(a)

```
array([[ 0.          ,  1.55740772, -2.18503986],  
       [-0.14254654,  1.15782128, -3.38051501],  
       [-0.29100619,  0.87144798, -6.79971146]])
```

np.sum(a)

36

np.mean(a)

4.0

np.trace(a)

12

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

```
array([ 9, 12, 15])
```

```
a
```

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

```
       [3, 4, 5],
```

```
       [6, 7, 8]])
```

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

```
array([ 3, 12, 21])
```

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

```
array([3., 4., 5.])
```

```
np.transpose(a)
```

```
array([[0, 3, 6],
```

```
       [1, 4, 7],
```

```
       [2, 5, 8]])
```

```
np.linalg.det(a)
```

```
0.0
```

```
a=np.arange(1,5)
```

```
a
```

```
array([1, 2, 3, 4])
```

```
a=a.reshape(2,2)
```

```
a
```

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

```
       [3, 4]])
```


np.linalg.det(a)

-2.0000000000000004

np.linalg.inv(a)

array([[-2. , 1.],
 [1.5, -0.5]])

np.linalg.eig(a)

(array([-0.37228132, 5.37228132]), array([[-0.82456484, -0.41597356],
 [0.56576746, -0.90937671]]))

eig_value,eig_vector=np.linalg.eig(a)

eig_value

array([-0.37228132, 5.37228132])

eig_vector

array([[-0.82456484, -0.41597356],
 [0.56576746, -0.90937671]])

a=np.array([[2,1],[1,2]])

a

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

b=np.array([1,2])

b

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

```
np.linalg.solve(a,b)
```

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