

```
In [1]: import numpy as np
```

```
In [2]: np.__version__
```

```
Out[2]: '2.1.3'
```

```
In [3]: # creating a list  
my_list=[0,1,2,3,4,5]  
my_list
```

```
Out[3]: [0, 1, 2, 3, 4, 5]
```

```
In [4]: type(my_list)
```

```
Out[4]: list
```

```
In [5]: #code converting list to array
```

```
In [6]: arr=np.array(my_list)      #-----  
arr
```

```
Out[6]: array([0, 1, 2, 3, 4, 5])
```

```
In [7]: type(arr)
```

```
Out[7]: numpy.ndarray
```

```
In [8]: np.arange(10)
```

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

```
In [9]: np.arange(20)
```

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

```
In [10]: np.arange(5.0)
```

```
Out[10]: array([0., 1., 2., 3., 4.])
```

```
In [11]: np.arange(0,5)
```

```
Out[11]: array([0, 1, 2, 3, 4])
```

```
In [12]: np.arange(10,20)
```

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

```
In [13]: np.arange(20,10)
```

```
Out[13]: array([], dtype=int64)
```

```
In [14]: np.arange(-20,10)
```

```
Out[14]: array([-20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8,
                 -7, -6, -5, -4, -3, -2, -1,  0,  1,  2,  3,  4,  5,
                 6,  7,  8,  9])
```

```
In [15]: np.arange(0,20,2)
```

```
Out[15]: array([ 0,  2,  4,  6,  8, 10, 12, 14, 16, 18])
```

```
In [16]: # create variable
ar=np.arange(-30,20)
ar
```

```
Out[16]: array([-30, -29, -28, -27, -26, -25, -24, -23, -22, -21, -20, -19, -18,
                 -17, -16, -15, -14, -13, -12, -11, -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])
```

```
In [17]: np.arange()
```

```
-----
-
TypeError                                 Traceback (most recent call last)
Cell In[17], line 1
----> 1 np.arange()

TypeError: arange() requires stop to be specified.
```

```
In [ ]: np.arange(10,30,5) # step count 5
```

```
In [ ]: np.arange(10,30,5,8)
```

```
In [ ]: np.zeros(10)    #parameter tuning
```

```
In [18]: np.zeros(10,dtype=int)    # hyperparameter
```

```
Out[18]: array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0])
```

```
In [19]: np.zeros((2,2),dtype=int)
```

```
Out[19]: array([[0, 0],
                 [0, 0]])
```

```
In [20]: zero=np.zeros([2,2])
print(zero)
print('###')
```

```
print(type(zero))  
[[0. 0.]  
 [0. 0.]]  
###  
<class 'numpy.ndarray'>
```

```
In [21]: np.zeros((2,10))
```

```
Out[21]: array([[0., 0., 0., 0., 0., 0., 0., 0., 0., 0.],  
                 [0., 0., 0., 0., 0., 0., 0., 0., 0., 0.]])
```

```
In [22]: np.zeros((10,10),dtype=int)
```

```
Out[22]: array([[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0],  
                 [0, 0, 0, 0, 0, 0, 0, 0, 0, 0]])
```

```
In [23]: np.ones(3,dtype=int)
```

```
Out[23]: array([1, 1, 1])
```

```
In [24]: np.ones((3,3),dtype=int)
```

```
Out[24]: array([[1, 1, 1],  
                 [1, 1, 1],  
                 [1, 1, 1]])
```

```
In [25]: np.two((2,3))
```

```
-----  
-  
AttributeError                                     Traceback (most recent call last)  
t)  
Cell In[25], line 1  
----> 1 np.two((2,3))  
  
File /opt/anaconda3/lib/python3.13/site-packages/numpy/__init__.py:414, in  
__getattr__(attr)  
    411     import numpy.char as char  
    412     return char.chararray  
--> 414 raise AttributeError("module {!r} has no attribute "  
    415                           "{!r}".format(__name__, attr))  
  
AttributeError: module 'numpy' has no attribute 'two'
```

```
In [26]: # random (how otp are generated
```

```
In [27]: rand(3,2)
```

```
-  
NameError  
t)  
Cell In[27], line 1  
----> 1 rand(3,2)  
  
NameError: name 'rand' is not defined
```

```
In [28]: random.rand(2,3)
```

```
-  
NameError  
t)  
Cell In[28], line 1  
----> 1 random.rand(2,3)  
  
NameError: name 'random' is not defined
```

```
In [29]: np.random.rand(3)
```

```
Out[29]: array([0.54664296, 0.59000821, 0.28210014])
```

```
In [30]: np.random.rand(5)
```

```
Out[30]: array([0.81270969, 0.35407385, 0.91890343, 0.29963731, 0.83207545])
```

```
In [31]: np.random.rand(3,4)
```

```
Out[31]: array([[0.56075889, 0.58331837, 0.00891002, 0.31593193],  
[0.93656467, 0.73310976, 0.1348518 , 0.68907565],  
[0.76202671, 0.54214891, 0.75704858, 0.87962962]])
```

```
In [32]: np.random.randint(4,6)
```

```
Out[32]: 4
```

```
In [33]: np.random.randint(2,20,4)
```

```
Out[33]: array([8, 2, 7, 4])
```

```
In [34]: np.random.randint(30,20,10)
```

```
-  
ValueError  
t)  
Cell In[34], line 1  
----> 1 np.random.randint(30,20,10)  
  
File numpy/random/mtrand.pyx:798, in numpy.random.mtrand.RandomState.randint()  
  
File numpy/random/_bounded_integers.pyx:1334, in numpy.random._bounded_integers._rand_int64()  
  
ValueError: low >= high
```

```
In [35]: np.random.randint(-30,-20,10)
```

```
Out[35]: array([-23, -30, -25, -25, -24, -21, -28, -21, -23, -25])
```

```
In [36]: np.random.randint(3,9,1,3)
```

```
-  
TypeError  
t)  
Cell In[36], line 1  
----> 1 np.random.randint(3,9,1,3)  
  
File numpy/random/mtrand.pyx:777, in numpy.random.mtrand.RandomState.randint()  
  
TypeError: Cannot interpret '3' as a data type
```

```
In [37]: np.random.randint(10,40,(10,10))
```

```
Out[37]: array([[35, 19, 25, 28, 28, 22, 18, 21, 21, 33],  
                 [13, 15, 11, 23, 15, 11, 38, 32, 30, 13],  
                 [29, 14, 13, 12, 37, 37, 24, 24, 21, 18],  
                 [13, 31, 21, 12, 33, 34, 24, 18, 17, 30],  
                 [30, 13, 29, 16, 33, 21, 24, 16, 37, 16],  
                 [23, 20, 33, 37, 28, 31, 30, 22, 23, 23],  
                 [32, 10, 32, 29, 23, 16, 39, 32, 18, 11],  
                 [28, 37, 34, 24, 35, 23, 32, 25, 38, 36],  
                 [34, 22, 26, 32, 36, 19, 21, 10, 22, 31],  
                 [29, 38, 22, 39, 29, 12, 29, 23, 18, 28]])
```

```
In [38]: # arange reshape
```

```
In [39]: np.arange(1,13).reshape(3,4)
```

```
Out[39]: array([[ 1,  2,  3,  4],  
                  [ 5,  6,  7,  8],  
                  [ 9, 10, 11, 12]])
```

```
In [40]: np.arange(1,13).reshape(3,5)
```

```
-
ValueError
t)
Cell In[40], line 1
----> 1 np.arange(1,13).reshape(3,5)
```

```
Traceback (most recent call las
```

```
ValueError: cannot reshape array of size 12 into shape (3,5)
```

```
In [41]: np.arange(1,21).reshape(5,4)
```

```
Out[41]: array([[ 1,  2,  3,  4],
                 [ 5,  6,  7,  8],
                 [ 9, 10, 11, 12],
                 [13, 14, 15, 16],
                 [17, 18, 19, 20]])
```

```
In [42]: np.arange(1,13).reshape(6,2)
```

```
Out[42]: array([[ 1,  2],
                 [ 3,  4],
                 [ 5,  6],
                 [ 7,  8],
                 [ 9, 10],
                 [11, 12]])
```

```
In [43]: #slicing in matrix
```

slicing in matrix

```
In [44]: b=np.random.randint(10,20,(5,4))
```

```
In [45]: b
```

```
Out[45]: array([[14, 14, 11, 16],
                 [12, 17, 14, 19],
                 [16, 13, 13, 11],
                 [15, 19, 17, 17],
                 [19, 12, 11, 14]])
```

```
In [46]: type(b)
```

```
Out[46]: numpy.ndarray
```

```
In [47]: b[:]
```

```
Out[47]: array([[14, 14, 11, 16],  
                 [12, 17, 14, 19],  
                 [16, 13, 13, 11],  
                 [15, 19, 17, 17],  
                 [19, 12, 11, 14]])
```

```
In [48]: b[1:3]
```

```
Out[48]: array([[12, 17, 14, 19],  
                 [16, 13, 13, 11]])
```

```
In [49]: b[2]
```

```
Out[49]: array([16, 13, 13, 11])
```

```
In [50]: b[0,:]
```

```
Out[50]: array([14, 14, 11, 16])
```

```
In [51]: b[1,0]
```

```
Out[51]: np.int64(12)
```

```
In [52]: b[-3,3]
```

```
Out[52]: np.int64(11)
```

```
In [53]: b.max()
```

```
Out[53]: np.int64(19)
```

```
In [54]: b.min()
```

```
Out[54]: np.int64(11)
```

```
In [55]: b.mean()
```

```
Out[55]: np.float64(14.7)
```

```
In [56]: np.arange(1,10).reshape(3,3)
```

```
Out[56]: array([[1, 2, 3],  
                 [4, 5, 6],  
                 [7, 8, 9]])
```

```
In [57]: np.arange(1,10).reshape(3,3,order='C')
```

```
Out[57]: array([[1, 2, 3],  
                 [4, 5, 6],  
                 [7, 8, 9]])
```

```
In [58]: np.arange(1,10).reshape(3,3,order='F')
```

```
Out[58]: array([[1, 4, 7],  
                 [2, 5, 8],  
                 [3, 6, 9]])
```

```
In [60]: b[:,2]
```

```
Out[60]: array([11, 14, 13, 17, 11])
```

```
In [62]: b[:]
```

```
Out[62]: array([[14, 14, 11, 16],  
                  [12, 17, 14, 19],  
                  [16, 13, 13, 11],  
                  [15, 19, 17, 17],  
                  [19, 12, 11, 14]])
```

```
In [63]: b[::-3]
```

```
Out[63]: array([[19, 12, 11, 14],  
                  [12, 17, 14, 19]])
```

```
In [65]: b[:-3]
```

```
Out[65]: array([[14, 14, 11, 16],  
                  [12, 17, 14, 19]])
```

```
In [66]: b[::-1]
```

```
Out[66]: array([[19, 12, 11, 14],  
                  [15, 19, 17, 17],  
                  [16, 13, 13, 11],  
                  [12, 17, 14, 19],  
                  [14, 14, 11, 16]])
```

```
In [67]: b[0,3]
```

```
Out[67]: np.int64(16)
```

```
In [68]: b[0:-2]
```

```
Out[68]: array([[14, 14, 11, 16],  
                  [12, 17, 14, 19],  
                  [16, 13, 13, 11]])
```

```
In [69]: b[0::2,1]
```

```
Out[69]: array([14, 13, 12])
```

```
In [73]: b[0::2,0::2]
```

```
Out[73]: array([[14, 11],  
                 [16, 13],  
                 [19, 11]])
```

```
In [75]:
```

```
---
```

```
NameError  
t)  
Cell In[75], line 1  
----> 1 b[r,c]
```

```
Traceback (most recent call las
```

```
NameError: name 'r' is not defined
```

```
In [ ]:
```