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

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

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

In [4]:
```
my_list=[0,1,2,3,4,5]
my_list
```

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

In [5]:
```
type(my_list)
```

Out[5]:
```
list
```

In [6]:
```
my_list
```

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

In [7]:
```
arr=np.array(my_list)
arr
```

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

In [8]:
```
print(type(arr))
```

```
<class 'numpy.ndarray'>
```

In [9]:
```
np.arange(10)
```

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

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

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

In [11]:
```
np.arange(10,50,5)
```

Out[11]:
```
array([10, 15, 20, 25, 30, 35, 40, 45])
```

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

Out[12]:
```
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 [13]:
```
np.zeros(5)
```

Out[13]:
```
array([0., 0., 0., 0., 0.])
```

In [14]:
```
np.zeros([2,2])
```

Out[14]:
```
array([[0., 0.],
       [0., 0.]])
```

In [15]:
```
np.zeros([5,4])
```

Out[15]:
```
array([[0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.]])
```

In [16]:
```
np.zeros((10,10),dtype=int)
```

Out[16]:
```
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 [17]:
```
np.ones(2)
```

Out[17]:
```
array([1., 1.])
```

In [18]:
```
np.ones(2,dtype=int)
```

Out[18]:
```
array([1, 1])
```

In [19]:
```
np.ones([2,2])
```

Out[19]:
```
array([[1., 1.],
       [1., 1.]])
```

In [20]:
```
np.ones([4,5])
```

Out[20]:
```
array([[1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.]])
```

In [21]:
```
arr
```

Out[21]:
```
array([0, 1, 2, 3, 4, 5])
```

In [22]:
```
rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[22], line 1
----> 1 rand(3,2)

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

In [23]:
```
random.rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[23], line 1
----> 1 random.rand(3,2)

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

In [27]:
```
np.random.rand(3)
```

Out[27]:
```
array([0.76127775, 0.24534203, 0.08740323])
```

In [28]:
```
np.random.randint(4,6)
```

Out[28]:
```
5
```

In [29]:
```
np.random.randint(0,10,4)
```

Out[29]:
```
array([9, 3, 0, 7], dtype=int32)
```

In [41]:
```
n=np.random.randint(10,40,(8,10))
n
```

Out[41]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [42]:
```
n[5]
```

Out[42]:
```
array([21, 22, 10, 26, 21, 26, 21, 28, 22, 30], dtype=int32)
```

In [43]:
```
n
```

Out[43]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [44]:
```
n[0:6]
```

Out[44]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30]], dtype=int32)
```

In [45]:
```
n
```

Out[45]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [46]:
```
n[::-1]
```

Out[46]:
```
array([[31, 32, 22, 20, 38, 29, 14, 31, 23, 38],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 10, 38, 32, 13, 32, 26, 22, 19, 26]], dtype=int32)
```

In [47]:
```
n
```

Out[47]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [48]:
```
n[::2]
```

Out[48]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25]], dtype=int32)
```

In [49]:
```
n
```

Out[49]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [50]:
```
n[0]
```

Out[50]:
```
array([17, 10, 38, 32, 13, 32, 26, 22, 19, 26], dtype=int32)
```

In [51]:
```
n
```

Out[51]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [52]:
```
n[0:5]
```

Out[52]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29]], dtype=int32)
```

In [53]:
```
n[0,5]
```

Out[53]:
```
np.int32(32)
```

In [54]:
```
n
```

Out[54]:
```
array([[17, 10, 38, 32, 13, 32, 26, 22, 19, 26],
       [17, 32, 17, 22, 39, 33, 19, 34, 36, 31],
       [17, 12, 30, 21, 34, 37, 14, 18, 17, 17],
       [38, 16, 18, 34, 10, 34, 23, 18, 36, 13],
       [36, 15, 31, 25, 35, 27, 20, 33, 10, 29],
       [21, 22, 10, 26, 21, 26, 21, 28, 22, 30],
       [17, 32, 13, 37, 38, 25, 12, 14, 16, 25],
       [31, 32, 22, 20, 38, 29, 14, 31, 23, 38]], dtype=int32)
```

In [55]:
```
n[5,-3]
```

Out[55]:
```
np.int32(28)
```

In [56]:
```
import numpy as np
x=np.int32(10)
print(x)
```

```
10
```

In [57]:
```
np.arange(1,13).reshape(6,2)
```

Out[57]:
```
array([[ 1,  2],
       [ 3,  4],
       [ 5,  6],
       [ 7,  8],
       [ 9, 10],
       [11, 12]])
```