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

In [3]:
```
np.__version__
```

Out[3]:
```
'1.26.4'
```

In [7]:
```
import sys
sys.version
```

Out[7]:
```
'3.12.7 | packaged by Anaconda, Inc. | (main, Oct  4 2024, 13:17:27) [MSC v.1929 6
4 bit (AMD64)]'
```

creating arrays

In [10]:
```
my_list=[0,1,2,3,4,5]
```

In [12]:
```
my_list
```

Out[12]:
```
[0, 1, 2, 3, 4, 5]
```

In [14]:
```
type(my_list)
```

Out[14]:
```
list
```

In [16]:
```
arr=np.array(my_list)
```

In [18]:
```
arr
```

Out[18]:
```
array([0, 1, 2, 3, 4, 5])
```

In [20]:
```
type(arr)
```

Out[20]:
```
numpy.ndarray
```

In [22]:
```
type(my_list)
```

Out[22]:
```
list
```

In [26]:
```
np.arange(15)
```

Out[26]:
```
array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14])
```

In [28]:
```
np.arange(3.0)
```

Out[28]:
```
array([0., 1., 2.])
```

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

Out[30]:
```
array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
```

In [34]:
```
np.arange(0,5)
```

Out[34]:
```
array([0, 1, 2, 3, 4])
```

In [38]:
```
np.arange(10,20)
```

Out[38]:
```
array([10, 11, 12, 13, 14, 15, 16, 17, 18, 19])
```

In [42]:
```
np.arange(20,10)
```

Out[42]:
```
array([], dtype=int32)
```

In [44]:
```
np.arange(-20,10)
```

Out[44]:
```
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 [46]:
```
np.arange(-16,10)
```

Out[46]:
```
array([-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 [48]:
```
np.arange(-20,-10)
```

Out[48]:
```
array([-20, -19, -18, -17, -16, -15, -14, -13, -12, -11])
```

In [50]:
```
np.arange(30,20)
```

Out[50]:
```
array([], dtype=int32)
```

In [52]:
```
np.arange(-30,20)
```

Out[52]:
```
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 [54]:
```
ar=np.arange(-30,20)
```

In [56]:
```
ar
```

Out[56]:
```
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 [58]:
```
np.arange(10,10)
```

Out[58]:
```
array([], dtype=int32)
```

In [60]:
```
np.arange()
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[60], line 1
----> 1 np.arange()

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

In [62]:
```
np.arange(10,30,5)
```

Out[62]:
```
array([10, 15, 20, 25])
```

In [64]:
```
np.arange(10,30,5,8)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[64], line 1
----> 1 np.arange(10,30,5,8)

TypeError: Cannot interpret '8' as a data type
```

In [66]:
```
np.zeros(3)
```

Out[66]:
```
array([0., 0., 0.])
```

In [68]:
```
np.zeros(5,dtype=int)
```

Out[68]:
```
array([0, 0, 0, 0, 0])
```

In [70]:
```
np.zeros((2,2),dtype=int)
```

Out[70]:
```
array([[0, 0],
       [0, 0]])
```

In [76]:
```
zero=np.zeros([2,2])
zero
```

Out[76]:
```
array([[0., 0.],
       [0., 0.]])
```

In [78]:
```
print(type(zero))
```

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

In [82]:
```
np.zeros((2,10))
```

Out[82]:
```
array([[0., 0., 0., 0., 0., 0., 0., 0., 0., 0.],
       [0., 0., 0., 0., 0., 0., 0., 0., 0., 0.]])
```

In [84]:
```
np.zeros((2,2))
```

Out[84]:
```
array([[0., 0.],
       [0., 0.]])
```

In [86]:
```
np.zeros((10,30))
```

Out[86]:
```
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., 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., 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 [88]:
```
np.zeros((5,10))
```

Out[88]:
```
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.]])
```

In [ ]:

In [ ]:

In [ ]:

In [ ]:
```
n=(6,7)
n1=(6,8)
print(np.zeros((2,10)))
```

In [90]:
```
np.ones(3)
```

Out[90]:
```
array([1., 1., 1.])
```

In [92]:
```
np.ones(4,dtype=int)
```

Out[92]:
```
array([1, 1, 1, 1])
```

In [94]:
```
np.ones(4)
```

Out[94]:
```
array([1., 1., 1., 1.])
```

In [101…
```
np.twos((2,3))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[101], line 1
----> 1 np.twos((2,3))

File ~\anaconda3\Lib\site-packages\numpy\__init__.py:333, in __getattr__(attr)
    330     "Removed in NumPy 1.25.0"
    331     raise RuntimeError("Tester was removed in NumPy 1.25.")
--> 333 raise AttributeError("module {!r} has no attribute "
    334                       "{!r}".format(__name__, attr))

AttributeError: module 'numpy' has no attribute 'twos'
```

In [103…
```
np.three((2,3))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[103], line 1
----> 1 np.three((2,3))

File ~\anaconda3\Lib\site-packages\numpy\__init__.py:333, in __getattr__(attr)
    330     "Removed in NumPy 1.25.0"
    331     raise RuntimeError("Tester was removed in NumPy 1.25.")
--> 333 raise AttributeError("module {!r} has no attribute "
    334                       "{!r}".format(__name__, attr))

AttributeError: module 'numpy' has no attribute 'three'
```

In [105…
```
np.ones(3)
```

Out[105… array([1., 1., 1.])

In [107…
```
rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[107], line 1
----> 1 rand(3,2)

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

In [109…
```
random.rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[109], line 1
----> 1 random.rand(3,2)

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

In [111…
```
np.random.rand(5)
```

Out[111… array([0.48078582, 0.05152095, 0.17577659, 0.81950088, 0.30370423])

In [131…
```
np.rand(4)
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[131], line 1
----> 1 np.rand(4)

File ~\anaconda3\Lib\site-packages\numpy\__init__.py:333, in __getattr__(attr)
    330     "Removed in NumPy 1.25.0"
    331     raise RuntimeError("Tester was removed in NumPy 1.25.")
--> 333 raise AttributeError("module {!r} has no attribute "
    334                      "{!r}".format(__name__, attr))

AttributeError: module 'numpy' has no attribute 'rand'
```

In [164…
```
np.random.randint(2,4)
```

Out[164…
```
2
```

In [121…
```
np.random.rand(2,4)
```

Out[121…
```
array([[0.38048881, 0.45930069, 0.37839793, 0.98542477],
       [0.01184403, 0.61233565, 0.93027086, 0.38395066]])
```

In [188…
```
np.random.randint(2,20)
```

Out[188…
```
15
```

In [174…
```
np.random.randint(0,1)
```

Out[174…
```
0
```

In [192…
```
np.random.randint(10,20,5)
```

Out[192…
```
array([16, 19, 14, 17, 19])
```

In [198…
```
np.random.randint(1,6,4)
```

Out[198…
```
array([3, 3, 5, 4])
```

In [200…
```
np.random.rand(3)
```

Out[200…
```
array([0.6209044 , 0.12898482, 0.20518434])
```

In [202…
```
np.random.randint(1)
```

Out[202…
```
0
```

In [206…
```
np.random.randint(-30,20,10)
```

Out[206…
```
array([ 17, -19, -16,  17, -24,   2,  16,  -8,  13,  -9])
```

In [208…
```
import numpy as np
```

In [212…
```
np.zeros((1),dtype=int)
```

Out[212…
```
array([0])
```

In [214…
```
np.zeros((2,3),dtype=int)
```

Out[214…
```
array([[0, 0, 0],
       [0, 0, 0]])
```

In [216…
```
np.arange(2,4)
```

Out[216…
```
array([2, 3])
```

In [224…
```
np.array((1,2,3,4))
```

Out[224…
```
array([1, 2, 3, 4])
```

In [240…
```
np.random.rand(0,24,6)
```

Out[240…
```
array([], shape=(0, 24, 6), dtype=float64)
```

In [243…
```
size=int(input("enter the size of array"))
a=[]
for i in range(size):
    val=int(input("enter the element"))
    a.append(val)
    print(a)
```

```
[2]
[2, 3]
[2, 3, 4]
[2, 3, 4, 5]
[2, 3, 4, 5, 5]
[2, 3, 4, 5, 5, 6]
[2, 3, 4, 5, 5, 6, 7]
[2, 3, 4, 5, 5, 6, 7, 8]
[2, 3, 4, 5, 5, 6, 7, 8, 9]
[2, 3, 4, 5, 5, 6, 7, 8, 9, 9]
```

In [245…
```
arr=int(input("please enter the size of array"))
a=[]
for i in range(arr):
    val=int(input("please enter the element"))
    a.append(val)
    print(a)
```

```
[4]
[4, 4]
[4, 4, 4]
[4, 4, 4, 4]
```

In [247…
```
np.random.randint(20,30,10)
```

Out[247…
```
array([22, 28, 24, 27, 23, 21, 25, 26, 28, 20])
```

In [249…
```
np.random.randint(5,9)
```

Out[249…
```
8
```

In [253…
```
np.random.randint(10,40,(10,10))
```

Out[253…
```
array([[13, 20, 32, 18, 13, 38, 19, 14, 15, 21],
       [30, 25, 15, 33, 17, 12, 33, 25, 15, 33],
       [14, 33, 28, 18, 19, 23, 32, 15, 36, 14],
       [28, 37, 22, 30, 16, 22, 26, 34, 37, 15],
       [11, 23, 13, 19, 21, 22, 34, 18, 39, 36],
       [20, 27, 29, 23, 36, 15, 36, 22, 13, 36],
       [16, 21, 18, 32, 36, 17, 26, 32, 27, 26],
       [21, 39, 34, 33, 38, 22, 18, 12, 24, 18],
       [15, 18, 33, 19, 18, 20, 20, 21, 12, 22],
       [33, 12, 22, 13, 33, 17, 24, 15, 30, 24]])
```

In [255…
```
np.random.randint(1,100,(12,12))
```

Out[255…
```
array([[14, 16, 78,  3, 65, 44, 61, 71,  9, 43, 58, 16],
       [21, 30, 59, 54, 84, 53, 74, 87, 25, 47, 59, 67],
       [40, 14, 84, 43, 69, 45, 59, 13, 35, 14, 59,  3],
       [31, 32, 63, 61, 20, 92, 38, 51, 24, 29, 59, 52],
       [18, 47, 34, 90, 46, 31, 69, 74, 94, 37, 50, 43],
       [81, 15, 45, 83, 23, 65, 56, 94, 36, 60, 68, 42],
       [34, 29, 64, 54,  8, 63, 23, 10, 64, 70,  6, 28],
       [12, 55,  6, 70, 70,  2, 73, 10, 93, 27, 78, 13],
       [97, 83, 52, 98, 92, 73, 12, 95, 37, 86, 55, 96],
       [49, 28, 97, 76, 52, 78, 81, 20, 90, 93, 26, 71],
       [68,  5, 62, 76, 97, 39,  6, 31, 26, 74, 20, 39],
       [56, 95, 26,  9, 64, 25, 69, 48,  4, 55, 26, 33]])
```

In [257…
```
np.arange(1,13).reshape(3,4)
```

Out[257…
```
array([[ 1,  2,  3,  4],
       [ 5,  6,  7,  8],
       [ 9, 10, 11, 12]])
```

In [259…
```
np.arange(1,13).reshape(12,1)
```

Out[259…
```
array([[ 1],
       [ 2],
       [ 3],
       [ 4],
       [ 5],
       [ 6],
       [ 7],
       [ 8],
       [ 9],
       [10],
       [11],
       [12]])
```

In [261…
```
np.arange(1,13).reshape(5,4)# cannot reshape because
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[261], line 1
----> 1 np.arange(1,13).reshape(5,4)

ValueError: cannot reshape array of size 12 into shape (5,4)
```

In [275…
```
b=np.random.randint(10,20,(5,4))
```

In [277…
```
b
```

Out[277…
```
array([[19, 11, 14, 15],
       [16, 14, 18, 15],
       [12, 16, 18, 11],
       [16, 11, 10, 16],
       [14, 10, 16, 13]])
```

In [279…
```
type(b)
```

Out[279…
```
numpy.ndarray
```

In [281…
```
b[:]
```

Out[281…
```
array([[19, 11, 14, 15],
       [16, 14, 18, 15],
       [12, 16, 18, 11],
       [16, 11, 10, 16],
       [14, 10, 16, 13]])
```

In [283…
```
b[1:3]
```

Out[283…
```
array([[16, 14, 18, 15],
       [12, 16, 18, 11]])
```

In [285…
```
b[1,2]
```

Out[285…
```
18
```

In [287…
```
b[1,3]# shows th
```

Out[287…
```
15
```

b[2,-1]

In [295…
```
b[2:3]
```

Out[295…
```
array([[12, 16, 18, 11]])
```

In [297…
```
b[0:-2]
```

Out[297…
```
array([[19, 11, 14, 15],
       [16, 14, 18, 15],
       [12, 16, 18, 11]])
```

In [299…
```
b[-5,-3]
```

Out[299…
```
11
```

In [301…
```
b[-4,2]
```

Out[301…
```
18
```

In [ ]:
```
np.random.
```

In [303…
```
 from numpy import*
```

In [305…
```
a=[1,2,3,4,9]
median(a)
```

Out[305…
```
3.0
```

Reshaping --- 3formats order c- order f- order a-orbitary index similar to c order

In [308…
```
arr
```

Out[308…
```
4
```

In [310…
```
mat=np.arange(0,100).reshape(10,10)
```

In [312…
```
mat
```

Out[312…
```
array([[ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9],
       [10, 11, 12, 13, 14, 15, 16, 17, 18, 19],
       [20, 21, 22, 23, 24, 25, 26, 27, 28, 29],
       [30, 31, 32, 33, 34, 35, 36, 37, 38, 39],
       [40, 41, 42, 43, 44, 45, 46, 47, 48, 49],
       [50, 51, 52, 53, 54, 55, 56, 57, 58, 59],
       [60, 61, 62, 63, 64, 65, 66, 67, 68, 69],
       [70, 71, 72, 73, 74, 75, 76, 77, 78, 79],
       [80, 81, 82, 83, 84, 85, 86, 87, 88, 89],
       [90, 91, 92, 93, 94, 95, 96, 97, 98, 99]])
```

In [318…
```
row = 4
col=5
```

In [320…
```
mat[row,col]
```

Out[320…
```
45
```

In [322…
```
mat[4,5]
```

Out[322…
```
45
```

In [324…
```
mat[:,3]
```

Out[324… array([3, 13, 23, 33, 43, 53, 63, 73, 83, 93])

In [ ]: