Numpy Crash Course

```
import numpy as np
```

```
np.__version__
```

```
'1.26.4'
```

```
import sys
sys.version
```

```
'3.12.7 | packaged by Anaconda, Inc. | (main, Oct  4 2024, 13:17:27)
[MSC v.1929 64 bit (AMD64)]'
```

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

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

```
type(my_list)
```

```
list
```

```
arr=np.array(my_list)
```

```
arr
```

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

```
type(arr)
```

```
numpy.ndarray
```

```
type(my_list)
```

```
list
```

```
np.arange(15)
```

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

```
np.arange(10)
```

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

```
np.arange(3.0)
```

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

```
np.arange(9)
```

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

```
np.arange(10,20)
```

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

```
np.arange(0,5)
```

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

```
np.arange(20,10)  #arg1<arg2
```

```
array([], dtype=int32)
```

```
np.arange(-20,10)
```

```
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])
```

```
np.arange()
```

```
---------------------------------------------------------------------
-----
TypeError                                 Traceback (most recent call
last)
Cell In[44], line 1
----> 1 np.arange()

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

```
np.arange(10,30,5)
```

```
array([10, 15, 20, 25])
```

```
np.arange(10,30,5,8)
```

```
---------------------------------------------------------------------
-----
TypeError                                 Traceback (most recent call
last)
Cell In[48], line 1
----> 1 np.arange(10,30,5,8)

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

```
np.zeros(3)
```

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

```
np.zeros(10, dtype=int) # mention dat type
```

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

```python
np.zeros(10)  #by default float
```

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

```python
np.zeros((2,2), dtype=int)
```

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

```python
np.zeros((2,10))
```

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

```python
np.zeros((5,10), dtype=int)
```

```
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]])
```

```python
np.zeros((10,30))
```

```
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.]])

np.zeros(10)

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

np.ones(3, dtype=int)

array([1, 1, 1])

np.ones((5,4), dtype=int)

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

np.twos((2,3))

---------------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
Cell In[55], line 1
----> 1 np.twos((2,3))

File C:\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'

np.three((2,3))

---------------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
Cell In[57], line 1
----> 1 np.three((2,3))

File C:\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'
```

```
rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[59], line 1
----> 1 rand(3,2)

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

```
random.rand(3,2)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[61], line 1
----> 1 random.rand(3,2)

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

```
np.random.rand(5, )
```

```
array([0.83373671, 0.33115227, 0.49022519, 0.03569783, 0.37390553])
```

```
np.rand(4)       #mention the module name
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[65], line 1
----> 1 np.rand(4)

File C:\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'
```

```
np.random.rand(4)
```

```
array([0.1696582 , 0.16277627, 0.10808648, 0.5086038 ])
```

```
np.random.rand(3,5)        #package.module.method()
```

```
array([[0.26953107, 0.01692779, 0.2235903 , 0.9756934 , 0.43932337],
       [0.0665355 , 0.63878211, 0.4018124 , 0.33127761, 0.53436685],
       [0.37384283, 0.14221098, 0.51179161, 0.77561169, 0.07449682]])
```

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

```
array([[0.4163474 , 0.55753683, 0.21783889, 0.14224907, 0.16836978],
       [0.74165663, 0.0430314 , 0.04904652, 0.38012968, 0.01494097],
       [0.67402173, 0.87296707, 0.33101865, 0.84296031, 0.59230957]])
```

```
np.random.randint(1,100,(12,12))
```

```
array([[10, 35, 27, 65, 29, 92, 74, 31, 27, 62, 75, 57],
       [78, 58, 25, 98,  9, 64, 14, 20,  4, 75, 34, 77],
       [96, 85, 78, 76, 57, 63, 50, 57, 62, 94, 70, 52],
       [28, 12, 82, 11,  7, 96, 79, 17, 44, 64, 26, 90],
       [90, 84,  1, 79, 29, 37, 86, 17,  9, 13, 52, 91],
       [ 6, 69, 81, 19, 84, 17, 36, 41, 12, 58, 52, 73],
       [32, 41, 23, 87, 89, 13, 66, 33, 69,  8, 90, 56],
       [20, 25, 90, 75,  1, 83, 11, 78, 16, 67,  5,  1],
       [47, 29, 74, 49, 38,  4, 96, 90, 51, 35, 89, 69],
       [66, 21, 14, 54, 18, 34, 42, 27, 44, 28, 63, 43],
       [26, 88, 28, 74, 17, 78, 48, 11, 26, 35, 21, 96],
       [83, 91, 28, 59, 39,  9, 25, 83, 80,  5, 74, 71]])
```

```
np.arange(1,13).reshape(6,2)
```

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

```
np.arange(1,13).reshape(12,1)
```

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

```
np.arange(1,12) # work like range
```

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

```
np.arange(1,13)
```

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

```
np.random.randint(10,40,(10,10))
```

```
array([[19, 33, 12, 10, 31, 27, 15, 13, 12, 29],
       [35, 22, 18, 26, 12, 10, 33, 25, 38, 11],
       [34, 10, 10, 25, 26, 32, 32, 36, 28, 12],
       [33, 12, 24, 21, 24, 10, 33, 12, 14, 13],
       [11, 14, 12, 38, 17, 29, 26, 39, 37, 30],
       [25, 12, 25, 17, 26, 20, 20, 20, 13, 32],
       [19, 22, 30, 25, 25, 34, 30, 32, 35, 21],
       [21, 29, 36, 19, 29, 24, 20, 25, 30, 34],
       [23, 16, 14, 17, 33, 23, 36, 21, 24, 12],
       [25, 11, 16, 15, 20, 23, 12, 32, 11, 23]])
```

```
b=np.random.randint(10,20,(5,4))
```

```
b
```

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

```
type(b)
```

```
numpy.ndarray
```

```
b
```

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

```
b[:]
```

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

```
b[1:3]
```

```
array([[18, 11, 12, 11],
       [17, 17, 12, 10]])
```

```
b[1,2]  #1st row, 2nd col for printing specific element
```

```
12
```

```
b[1,3]
```

```
11
```

```
b[1,-1]
```

```
11
```

```
b[2:3]
```

```
array([[17, 17, 12, 10]])
```

```
b
```

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

```
a=np.random.randint(10,20,10)
```

```
a
```

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

```
id(a)
```

```
2593716010704
```

```
arr2=np.random.randint(0,100,(10,10))
```

```
arr2
```

```
array([[10, 89, 82, 88, 45,  8, 96,  2, 27, 53],
       [10, 81, 35, 55, 11, 94,  7, 79,  9, 85],
       [46, 65, 65, 20, 81, 53, 81,  4,  7, 79],
       [ 6, 88,  5, 13, 44, 76, 35, 93, 24, 57],
       [53, 19, 82, 28, 13,  2, 20, 45,  0, 33],
       [72, 86, 90, 38,  3, 18, 77, 98, 66, 82],
       [41, 15, 13,  6, 99,  9, 43, 17, 35, 44],
       [ 2,  6, 85,  5, 10, 73, 41, 34, 36, 30],
       [62, 26, 14, 28, 49,  8, 63, 52, 14, 26],
       [65, 25, 24, 93, 46, 16, 85, 94, 19, 39]])
```