30-10-2025 Class Work

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

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

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

Creating List

In [3]:
```
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
```

1-D Array

In [5]:
```
arr = np.array(my_list)
arr
```

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

In [6]:
```
type(arr)
```

Out[6]:
```
numpy.ndarray
```

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

Out[7]:
```
list
```

np.arange(start, stop, step)

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, 16,
       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(-16, 10)
```

Out[15]:
```
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 [16]:
```
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 [18]:
```
np.arange(10, 30, 5)
```

Out[18]:
```
array([10, 15, 20, 25])
```

In [19]:
```
np.arange(0, 10, 3)
```

Out[19]:
```
array([0, 3, 6, 9])
```

In [20]:
```
np.arange(10, 30, 5, 8)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[20], line 1
----> 1 np.arange(10, 30, 5, 8)

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

np.zeros(shape, dtype)

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

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

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

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

2-D Array

In [23]:
```
np.zeros((2,2), dtype=int)
```

Out[23]:
```
array([[0, 0],
       [0, 0]])
```

In [24]:
```
zero = np.zeros([2,2])
print(zero)
print("____________________")
print(type(zero))
```

```
[[0. 0.]
 [0. 0.]]
____________________
<class 'numpy.ndarray'>
```

In [25]:
```
np.zeros((2, 10))
```

Out[25]:
```
array([[0., 0., 0., 0., 0., 0., 0., 0., 0., 0.],
       [0., 0., 0., 0., 0., 0., 0., 0., 0., 0.]])
```

In [26]:
```
np.zeros((10, 10), dtype=int)
```

Out[26]:
```
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]])
```

np.ones(shape, dtype)

In [27]:
```
np.ones(3)
```

Out[27]:
```
array([1., 1., 1.])
```

In [28]:
```
np.ones(3, dtype=int)
```

Out[28]:
```
array([1, 1, 1])
```

In [29]:
```
np.ones((3,3), dtype=int)
```

Out[29]:
```
array([[1, 1, 1],
       [1, 1, 1],
       [1, 1, 1]])
```

np.random

In [30]:
```
import random
```

In [31]:
```
random.rand(2,3)
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[31], line 1
----> 1 random.rand(2,3)

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

In [32]:
```
random.randint(10, 30)
```

Out[32]:
```
23
```

In [33]:
```
random.random()
```

Out[33]:
```
0.4257003949447242
```

In [34]:
```
np.random.rand(2,3)
```

Out[34]:
```
array([[1.07105520e-04, 3.34264493e-01, 5.66788544e-01],
       [8.95378164e-01, 7.68774750e-02, 8.32797178e-01]])
```

In [35]:
```
np.random.rand(5)
```

Out[35]:
```
array([0.59291028, 0.56484737, 0.88425969, 0.68994134, 0.76216324])
```

In [36]:
```
np.random.rand(3, 5)
```

Out[36]:
```
array([[0.13043176, 0.66958784, 0.03081517, 0.73874931, 0.88869629],
       [0.15409589, 0.01828096, 0.35237873, 0.84017872, 0.21691063],
       [0.89245709, 0.69433214, 0.27089986, 0.12499538, 0.08911423]])
```

np.random.randint(low, high, size)

In [37]:
```
np.random.randint(4, 6)
```

Out[37]:
```
5
```

In [38]:
```
np.random.randint(2, 20, 4)
```

Out[38]:
```
array([11, 14, 17, 17], dtype=int32)
```

In [39]:
```
np.random.randint(30, 20, 10)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[39], line 1
----> 1 np.random.randint(30, 20, 10)

File numpy\\random\\mtrand.pyx:796, in numpy.random.mtrand.RandomState.randint()

File numpy\\random\\_bounded_integers.pyx:1425, in numpy.random._bounded_integers._r
and_int32()

ValueError: low >= high
```

In [40]:
```
np.random.randint(-30, 20, 10)
```

Out[40]:
```
array([  1, -26, -28, -21,   8,  13, -11, -29, -23,  16], dtype=int32)
```

In [41]:
```
np.random.randint(-30, 20, 10, 5)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[41], line 1
----> 1 np.random.randint(-30, 20, 10, 5)

File numpy\\random\\mtrand.pyx:777, in numpy.random.mtrand.RandomState.randint()

TypeError: Cannot interpret '5' as a data type
```

In [42]:
```
np.random.randint(10, 40, (10, 10))
```

Out[42]:
```
array([[27, 36, 33, 25, 17, 26, 10, 27, 21, 26],
       [21, 18, 17, 37, 38, 39, 23, 35, 23, 31],
       [14, 17, 34, 20, 38, 11, 11, 17, 16, 34],
       [19, 12, 20, 34, 29, 11, 30, 32, 33, 32],
       [22, 34, 14, 35, 30, 30, 19, 12, 37, 18],
       [13, 22, 18, 18, 34, 31, 30, 11, 34, 25],
       [22, 11, 20, 17, 11, 21, 38, 15, 35, 27],
       [33, 38, 20, 13, 29, 37, 35, 13, 12, 38],
       [35, 39, 20, 35, 12, 16, 28, 14, 29, 13],
       [34, 23, 13, 35, 11, 33, 10, 33, 37, 12]], dtype=int32)
```

In [43]:
```
np.random.randint(1, 100, (12, 12))
```

Out[43]:
```
array([[97,  7, 46, 40,  9, 97, 30, 95, 51, 17, 95, 46],
       [77, 74, 55, 30, 37, 11, 60,  9, 44, 30, 45, 95],
       [17, 51, 60, 94, 50, 85, 91, 40, 27, 91, 68, 23],
       [53,  6, 65, 51, 63, 13,  3,  2, 53, 84, 48, 96],
       [91, 10, 67,  8, 73, 35,  9, 70, 43, 27, 88, 90],
       [81, 95,  4, 99,  9, 21,  8, 43, 31, 12, 38, 94],
       [10, 79,  6, 85, 77, 80, 34, 32,  2, 41, 34,  4],
       [19, 71, 36, 31, 91, 30, 35, 70, 92,  6, 42, 65],
       [62, 32, 51, 72, 73, 19, 10, 52, 25, 14, 15, 90],
       [59, 19, 67, 36, 36, 72, 36, 75, 66,  3, 29, 18],
       [13, 48,  1, 71, 90, 15, 33, 59, 92, 42, 94, 15],
       [52, 63, 77, 92, 91, 25, 51, 54, 92, 49, 53, 72]], dtype=int32)
```

.reshape(row, column)

In [44]:
```
arr
```

Out[44]:
```
array([0, 1, 2, 3, 4, 5])
```

In [45]:
```
np.arange(1, 13)
```

Out[45]:
```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12])
```

In [46]:
```
np.arange(1,13).reshape(3, 4)
```

Out[46]:
```
array([[ 1,  2,  3,  4],
       [ 5,  6,  7,  8],
       [ 9, 10, 11, 12]])
```

In [47]:
```
arr.reshape(2,3)
```

Out[47]:
```
array([[0, 1, 2],
       [3, 4, 5]])
```

In [48]:
```
np.arange(1, 13).reshape(1, 16)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[48], line 1
----> 1 np.arange(1, 13).reshape(1, 16)

ValueError: cannot reshape array of size 12 into shape (1,16)
```

In [49]:
```
np.arange(1, 13).reshape(1,12)
```

Out[49]:
```
array([[ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12]])
```

In [50]:
```
np.arange(1, 13).reshape(12, 1)
```

Out[50]:
```
array([[ 1],
       [ 2],
       [ 3],
       [ 4],
       [ 5],
       [ 6],
       [ 7],
       [ 8],
       [ 9],
       [10],
       [11],
       [12]])
```

Slicing in matrix

In [51]:
```
b = np.random.randint(10, 20, (5, 4))
b
```

Out[51]:
```
array([[17, 16, 12, 17],
       [12, 17, 16, 18],
       [16, 17, 19, 12],
       [13, 13, 11, 15],
       [15, 18, 17, 19]], dtype=int32)
```

In [52]:
```
type(b)
```

Out[52]:
```
numpy.ndarray
```

In [53]:
```
b[:]
```

Out[53]:
```
array([[17, 16, 12, 17],
       [12, 17, 16, 18],
       [16, 17, 19, 12],
       [13, 13, 11, 15],
       [15, 18, 17, 19]], dtype=int32)
```

In [54]:
```
b[0]
```

Out[54]:
```
array([17, 16, 12, 17], dtype=int32)
```

In [55]:
```
b[0][3]
```

Out[55]:
```
np.int32(17)
```

In [ ]: