

untitled

July 6, 2024

```
[1]: print("Hello")
```

Hello

Let's see creation of various nd arrays in numpy.

```
[4]: import numpy as np
```

```
[6]: arr1=np.array([1,2,3,4,5])
```

```
[8]: arr1
```

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

```
[10]: arr1
```

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

```
[12]: type(arr1)
```

```
[12]: numpy.ndarray
```

```
[14]: arr2=np.array([[1,2,3],[2,3,4]])
```

```
[16]: arr2
```

```
[16]: array([[1, 2, 3],  
          [2, 3, 4]])
```

```
[18]: type(arr2)
```

```
[18]: numpy.ndarray
```

```
[20]: arr2.ndim
```

```
[20]: 2
```

```
[60]: arr3=np.zeros((2,3))
```

```
[62]: arr3
```

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

```
[78]: arr3=np.twos((2,2,3))
```

```
-----
AttributeError                                Traceback (most recent call last)
Cell In[78], line 1
----> 1 arr3=np.twos((2,2,3))

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'
```

```
[72]: arr3
```

```
[72]: array([[[1., 1., 1.],
            [1., 1., 1.]],

            [[1., 1., 1.],
            [1., 1., 1.]])
```

```
[74]: arr3.ndim
```

```
[74]: 3
```

```
[76]: arr3
```

```
[76]: array([[[1., 1., 1.],
            [1., 1., 1.]],

            [[1., 1., 1.],
            [1., 1., 1.]])
```

```
[80]: arr4=np.identity(4)
```

```
[82]: arr4
```

```
[82]: array([[1., 0., 0., 0.],
            [0., 1., 0., 0.],
            [0., 0., 1., 0.],
            [0., 0., 0., 1.]])
```

```
[128]: arr5=np.arange(100,5,-5)
```

```
[130]: arr5
```

```
[130]: array([100, 95, 90, 85, 80, 75, 70, 65, 60, 55, 50, 45, 40,  
          35, 30, 25, 20, 15, 10])
```

```
[157]: arr7=np.linspace(10,20,5)
```

```
[159]: arr7
```

```
[159]: array([10. , 12.5, 15. , 17.5, 20. ])
```

```
[165]: arr8=arr7.copy()
```

```
[167]: arr8
```

```
[167]: array([10. , 12.5, 15. , 17.5, 20. ])
```

```
[169]: arr8
```

```
[169]: array([10. , 12.5, 15. , 17.5, 20. ])
```

```
[171]: type(arr8)
```

```
[171]: numpy.ndarray
```

```
[173]: arr8.ndim
```

```
[173]: 1
```

```
[175]: arr8=np.linspace()
```

```
-----  
TypeError                                Traceback (most recent call last)  
Cell In[175], line 1  
----> 1 arr8=np.linspace()  
  
TypeError: linspace() missing 2 required positional arguments: 'start' and 'stop'
```

```
[189]: arr8=np.linspace(1,2,10)
```

```
[191]: arr8
```

```
[191]: array([1.          , 1.11111111, 1.22222222, 1.33333333, 1.44444444,  
          1.55555556, 1.66666667, 1.77777778, 1.88888889, 2.          ])
```

```

[193]: arr1
[193]: array([1, 2, 3, 4, 5])

[195]: arr1.shape
[195]: (5,)

[197]: arr2.shape
[197]: (2, 3)

[199]: arr9=np.array([[[1,2],[3,4]],[[5,6],[7,8]]])

[201]: arr9
[201]: array([[[1, 2],
               [3, 4]],
              [[5, 6],
               [7, 8]]])

[203]: arr9.shape
[203]: (2, 2, 2)

[205]: arr2
[205]: array([[1, 2, 3],
               [2, 3, 4]])

[207]: arr2.ndim
[207]: 2

[ ]:

[210]: arr2.size
[210]: 6

[212]: arr9.size
[212]: 8

[214]: arr8
[214]: array([1.          , 1.11111111, 1.22222222, 1.33333333, 1.44444444,
              1.55555556, 1.66666667, 1.77777778, 1.88888889, 2.          ])

```

```
[216]: arr8.itemsize
```

```
[216]: 8
```

```
[218]: arr9
```

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

```
[220]: arr9.itemsize
```

```
[220]: 4
```

```
[222]: arr8.dtype
```

```
[222]: dtype('float64')
```

```
[224]: arr9.dtype
```

```
[224]: dtype('int32')
```

```
[226]: arr9.astype('float')
```

```
[226]: array([[[1., 2.],  
            [3., 4.]],  
  
          [[5., 6.],  
            [7., 8.]])
```

```
[228]: lista= range(100)  
      num=np.arange(100)
```

```
[230]: lista
```

```
[230]: range(0, 100)
```

```
[232]: num
```

```
[232]: 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])
```

```
[234]: import sys
```

```
[240]: print(sys.getsizeof(87)*len(num))
```

2800

```
[242]: print(num.itemsize*num.size)
```

400

```
[244]: import time
```

```
[326]: x = range(10000000)
y = range(10000000,20000000)
start = time.time()

c = [x+y for x,y in zip(x,y)]
print(time.time()-start)
```

1.7298686504364014

```
[328]: a = np.arange(10000000)
b = np.arange(10000000,20000000)
start = time.time()

c = a+b
print(time.time()-start)
```

0.18978166580200195

```
[330]: arr12=np.arange(24)
```

```
[332]: arr12
```

```
[332]: 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])
```

```
[371]: arr12=arr12.reshape((12,2))
```

```
[373]: arr1
```

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

```
[375]: arr1[-1]
```

```
[375]: 5
```

```
[381]: arr12=arr12.reshape(6,4)
```

```
[387]: arr12
```

```
[387]: 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]])
```

```
[454]: arr12[4:,2:]
```

```
[454]: array([[18, 19],
              [22, 23]])
```

```
[456]: arr3=[[1,2,3],[4,5,6],[7,8,9]]
```

```
arr3
```

```
[459]: arr3
```

```
[459]: [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

```
[505]: arr3[1:][1]
```

```
[505]: [7, 8, 9]
```

```
[507]: arr12
```

```
[507]: 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]])
```

```
[509]: for i in np.nditer(arr12):
        print(i)
```

```
0
1
2
3
4
5
6
7
8
9
10
11
12
```

13
14
15
16
17
18
19
20
21
22
23

```
[511]: arr1 = np.array([1,2,3,4,5])
```

```
[513]: arr2 = np.array([4,5,6,7,8])
```

```
[515]: arr1-arr2
```

```
[515]: array([-3, -3, -3, -3, -3])
```

```
[517]: arr1*arr2
```

```
[517]: array([ 4, 10, 18, 28, 40])
```

```
[519]: arr1
```

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

```
[521]: arr1>3
```

```
[521]: array([False, False, False,  True,  True])
```

```
[523]: arr3 = np.arange(6).reshape(2,3)  
arr4 = np.arange(6,12).reshape(3,2)
```

```
[527]: arr3
```

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

```
[529]: arr4
```

```
[529]: array([[ 6,  7],  
            [ 8,  9],  
            [10, 11]])
```

```
[525]: arr3.dot(arr4)
```



```
[525]: array([[ 28,  31],
            [100, 112]])
```

```
[531]: arr1
```

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

```
[533]: arr3
```

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

```
[535]: arr1.dot(arr3)
```

```
-----
ValueError                                Traceback (most recent call last)
Cell In[535], line 1
----> 1 arr1.dot(arr3)

ValueError: shapes (5,) and (2,3) not aligned: 5 (dim 0) != 2 (dim 0)
```

```
[537]: arr3
```

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

```
[539]: arr3.max()
```

```
[539]: 5
```

```
[541]: arr4
```

```
[541]: array([[ 6,  7],
            [ 8,  9],
            [10, 11]])
```

```
[543]: arr4.max
```

```
[543]: <function ndarray.max>
```

```
[545]: arr4.max()
```

```
[545]: 11
```

```
[547]: arr4.min()
```

```
[547]: 6
```

```
[551]: arr4
```

```
[551]: array([[ 6,  7],  
           [ 8,  9],  
           [10, 11]])
```

```
[553]: arr4.min(axis=0)
```

```
[553]: array([6, 7])
```

```
[561]: arr4.max(axis=1)
```

```
[561]: array([ 7,  9, 11])
```

```
[563]: arr4
```

```
[563]: array([[ 6,  7],  
           [ 8,  9],  
           [10, 11]])
```

```
[567]: arr4.sum()
```

```
[567]: 51
```

```
[569]: arr4.sum(axis=0)
```

```
[569]: array([24, 27])
```

```
[571]: arr4.mean()
```

```
[571]: 8.5
```

```
[573]: arr4.std()
```

```
[573]: 1.707825127659933
```

```
[575]: arr4.median()
```

```
-----  
AttributeError                                Traceback (most recent call last)  
Cell In[575], line 1  
----> 1 arr4.median()  
  
AttributeError: 'numpy.ndarray' object has no attribute 'median'
```

```
[577]: np.median(arr4)
```

[577]: 8.5

```
[579]: np.sin(arr4)
```

```
[579]: array([[ -0.2794155 ,  0.6569866 ],
           [ 0.98935825,  0.41211849],
           [-0.54402111, -0.99999021]])
```

```
[581]: np.cos(arr4)
```

```
[581]: array([[ 0.96017029,  0.75390225],
           [-0.14550003, -0.91113026],
           [-0.83907153,  0.0044257 ]])
```

```
[583]: np.tan(arr4)
```

```
[583]: array([[ -0.29100619,  0.87144798],
           [ -6.79971146, -0.45231566],
           [ 0.64836083, -225.95084645]])
```

```
[585]: np.cosec(arr4)
```

```
-----
AttributeError                                Traceback (most recent call last)
Cell In[585], line 1
----> 1 np.cosec(arr4)

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 'cosec'
```

```
[587]: np.sec(arr4)
```

```
-----
AttributeError                                Traceback (most recent call last)
Cell In[587], line 1
----> 1 np.sec(arr4)

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 'sec'
```

```
[589]: np.log(arr4)
```

```
[589]: array([[1.79175947, 1.94591015],  
            [2.07944154, 2.19722458],  
            [2.30258509, 2.39789527]])
```

```
[591]: np.exp(arr4)
```

```
[591]: array([[ 403.42879349, 1096.63315843],  
            [2980.95798704, 8103.08392758],  
            [22026.46579481, 59874.1417152 ]])
```

```
[597]: a = np.sqrt(arr4)
```

```
[599]: a
```

```
[599]: array([[2.44948974, 2.64575131],  
            [2.82842712, 3.          ],  
            [3.16227766, 3.31662479]])
```

```
[609]: a.astype('int')
```

```
[609]: array([[2, 2],  
            [2, 3],  
            [3, 3]])
```

```
[611]: a
```

```
[611]: array([[2, 2],  
            [2, 3],  
            [3, 3]])
```

```
[613]: a
```

```
[613]: array([[2, 2],  
            [2, 3],  
            [3, 3]])
```

```
[615]: a.revel
```

```
-----  
AttributeError                                Traceback (most recent call last)  
Cell In[615], line 1  
----> 1 a.revel
```

```
AttributeError: 'numpy.ndarray' object has no attribute 'revel'
```

```
[617]: a.ravel
```

```
[617]: <function ndarray.ravel>
```

```
[619]: a.ravel()
```

```
[619]: array([2, 2, 2, 3, 3, 3])
```

```
[621]: a.ravel()
```

```
[621]: array([2, 2, 2, 3, 3, 3])
```

```
[623]: np.nditer(a)
```

```
[623]: <numpy.nditer at 0x1b276626bf0>
```

```
[625]: for i in np.nditer(a):  
        print(i)
```

```
2  
2  
2  
3  
3  
3
```

```
[627]: arr4
```

```
[627]: array([[ 6,  7],  
           [ 8,  9],  
           [10, 11]])
```

```
[629]: arr4.transpose()
```

```
[629]: array([[ 6,  8, 10],  
           [ 7,  9, 11]])
```

```
[631]: arr5=np.arange(12,18)
```

```
[633]: arr5
```

```
[633]: array([12, 13, 14, 15, 16, 17])
```

```
[649]: arr5=arr5.reshape(2,3)
```

```
[651]: arr5
```

```
[651]: array([[12, 13, 14],
             [15, 16, 17]])
```

```
[653]: arr3
```

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

```
[655]: arr5
```

```
[655]: array([[12, 13, 14],
             [15, 16, 17]])
```

```
[657]: np.hstack((arr3,arr5))
```

```
[657]: array([[ 0,  1,  2, 12, 13, 14],
             [ 3,  4,  5, 15, 16, 17]])
```

```
[659]: np.vstack((arr3,arr5))
```

```
[659]: array([[ 0,  1,  2],
             [ 3,  4,  5],
             [12, 13, 14],
             [15, 16, 17]])
```

```
[661]: arr3
```

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

```
[671]: np.vsplit(arr3,2)
```

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

```
[673]: arr4
```

```
[673]: array([[ 6,  7],
             [ 8,  9],
             [10, 11]])
```

```
[675]: arr8
```

```
[675]: array([1.          , 1.11111111, 1.22222222, 1.33333333, 1.44444444,
             1.55555556, 1.66666667, 1.77777778, 1.88888889, 2.          ])
```

```
[677]: arr8
```

```
[677]: array([1.          , 1.11111111, 1.22222222, 1.33333333, 1.44444444,  
          1.55555556, 1.66666667, 1.77777778, 1.88888889, 2.          ])
```

```
[679]: arr8 = np.arange(20)
```

```
[685]: arr8=arr8.reshape(5,4)
```

```
[687]: arr8
```

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

```
[699]: arr8[[1,1+1,1]]
```

```
[699]: array([[ 4,  5,  6,  7],  
          [ 8,  9, 10, 11],  
          [ 4,  5,  6,  7]])
```

```
[737]: arr = np.random.randint(low=0,high=100, size=20).reshape(5,4)
```

```
[749]: arr
```

```
[749]: array([[78, 20, 70, 56],  
          [64, 98, 73, 14],  
          [35, 61, 35, 80],  
          [31, 12, 79, 13],  
          [ 0, 35, 82, 88]])
```

```
[740]: arr[arr>30+10+10+10]
```

```
[740]: array([78, 70, 64, 98, 73, 61, 80, 79, 82, 88])
```

```
[741]: arr[(arr>40) & (arr<70)]
```

```
[741]: array([56, 64, 61])
```

```
[751]: arr9
```

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

```
[755]: arr9[d]
```

```

-----
NameError                                Traceback (most recent call last)
Cell In[755], line 1
----> 1 arr9[d]

NameError: name 'd' is not defined

```

```
[759]: x = np.linspace(-40,40,100)
```

```
[761]: x
```

```
[761]: array([-40.          , -39.19191919, -38.38383838, -37.57575758,
        -36.76767677, -35.95959596, -35.15151515, -34.34343434,
        -33.53535354, -32.72727273, -31.91919192, -31.11111111,
        -30.3030303 , -29.49494949, -28.68686869, -27.87878788,
        -27.07070707, -26.26262626, -25.45454545, -24.64646465,
        -23.83838384, -23.03030303, -22.22222222, -21.41414141,
        -20.60606061, -19.79797978 , -18.98989899, -18.18181818,
        -17.37373737, -16.56565657, -15.75757576, -14.94949495,
        -14.14141414, -13.33333333, -12.52525253, -11.71717172,
        -10.90909091, -10.1010101 ,  -9.29292929,  -8.48484848,
        -7.67676768,  -6.86868687,  -6.06060606,  -5.25252525,
        -4.44444444,  -3.63636364,  -2.82828283,  -2.02020202,
        -1.21212121,  -0.4040404 ,   0.4040404 ,   1.21212121,
         2.02020202,   2.82828283,   3.63636364,   4.44444444,
         5.25252525,   6.06060606,   6.86868687,   7.67676768,
         8.48484848,   9.29292929,  10.1010101 ,  10.90909091,
        11.71717172,  12.52525253,  13.33333333,  14.14141414,
        14.94949495,  15.75757576,  16.56565657,  17.37373737,
        18.18181818,  18.98989899,  19.79797978 ,  20.60606061,
        21.41414141,  22.22222222,  23.03030303,  23.83838384,
        24.64646465,  25.45454545,  26.26262626,  27.07070707,
        27.87878788,  28.68686869,  29.49494949,  30.3030303 ,
        31.11111111,  31.91919192,  32.72727273,  33.53535354,
        34.34343434,  35.15151515,  35.95959596,  36.76767677,
        37.57575758,  38.38383838,  39.19191919,  40.          ])
```

```
[763]: y = np.sin(x)
```

```
[767]: y.size
```

```
[767]: 100
```

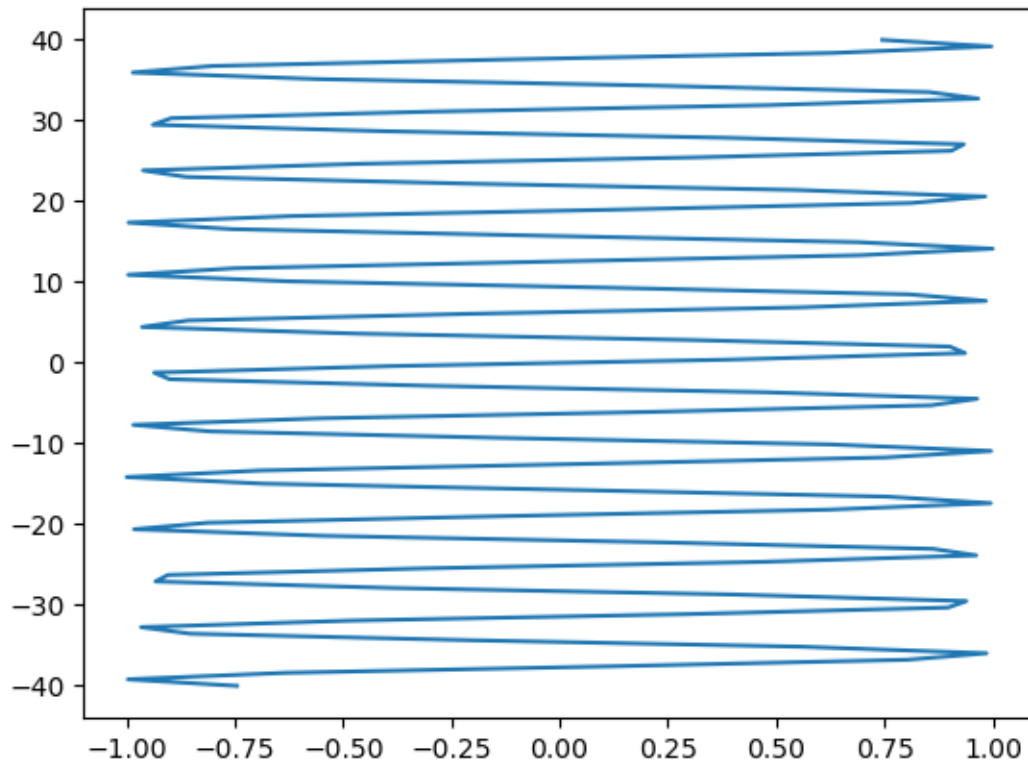
```
[771]: import matplotlib.pyplot as plt
```

```
[773]: %matplotlib inline
```



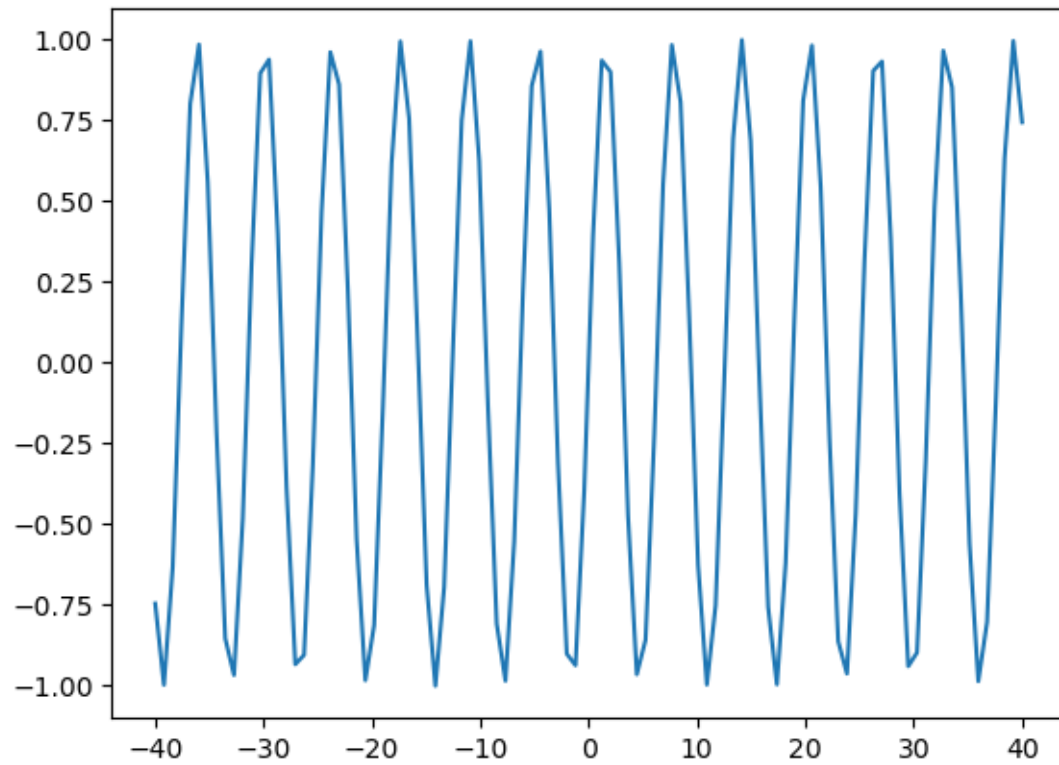
```
[775]: plt.plot(y,x)
```

```
[775]: [<matplotlib.lines.Line2D at 0x1b2766f1e20>]
```



```
[777]: plt.plot(x,y)
```

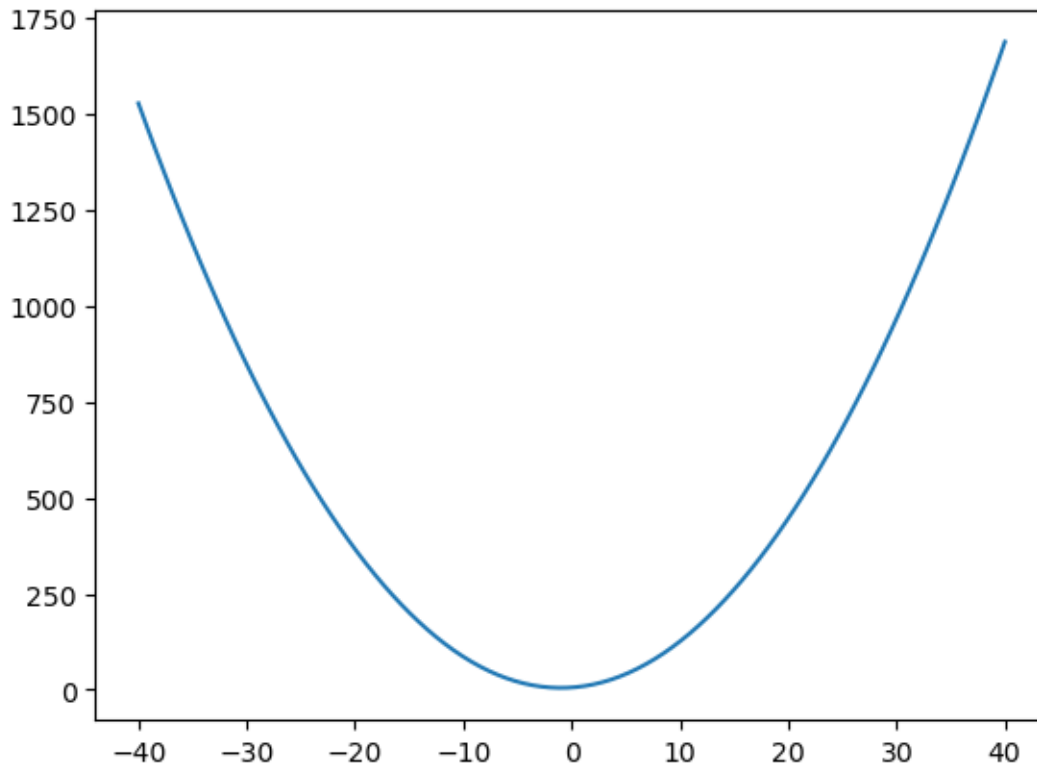
```
[777]: [<matplotlib.lines.Line2D at 0x1b275a92600>]
```



```
[779]: y = x*x + 2*x +6
```

```
[781]: plt.plot(x,y)
```

```
[781]: [<matplotlib.lines.Line2D at 0x1b275b599d0>]
```



0.1 Broadcasting

We can add dissimilar arrays also

```
[797]: arr1 = np.arange(20).reshape(4,5)
      arr2 = np.arange(20).reshape(4,5)
```

```
[799]: arr1+arr2
```

```
[799]: array([[ 0,  2,  4,  6,  8],
              [10, 12, 14, 16, 18],
              [20, 22, 24, 26, 28],
              [30, 32, 34, 36, 38]])
```

And think about various broadcasting examples

```
[826]: np.random.random()
```

```
[826]: 0.01013629848028863
```

```
[838]: np.random.seed(10)
      np.random.random()
```

```
[838]: 0.771320643266746
```

```
[844]: np.random.random()
```

```
[844]: 0.7488038825386119
```

```
[882]: np.random.uniform(1,10000000)
```

```
[882]: 1421701.333845222
```

```
[888]: a=np.random.uniform(1,29,100).astype('int')
```

```
[890]: a
```

```
[890]: array([13,  4, 23, 12,  1, 24,  8, 20, 10, 23, 24, 16, 16,  4, 11, 13, 15,
          25,  9, 12, 23, 12,  6, 24, 16,  2, 28,  7, 18, 11, 23, 18, 23,  9,
           8, 17, 27, 20,  8,  4, 13, 28, 20,  6,  2, 27, 25, 24, 27, 17, 27,
           5,  4, 11, 22,  9, 18,  1, 16, 10, 26, 27, 11, 12, 26,  2, 12,  4,
           3, 22,  9, 17, 25, 25, 17, 19,  2,  9, 20,  6, 23, 15, 22,  5,  3,
          14, 15, 20,  6, 19, 23,  2, 27, 28, 16,  2, 10,  1, 23,  6])
```

```
[900]: a[a==19]
```

```
[900]: array([19, 19])
```

```
[914]: b = np.random.randint(2,100,10)
```

```
[932]: b=b.reshape(5,2)
```

```
[938]: b
```

```
[938]: array([[30, 28],
          [96,  3],
          [93,  4],
          [90, 62],
          [53, 15]])
```

```
[934]: b.max()
```

```
[934]: 96
```

```
[942]: np.argmax(b)
```

```
[942]: 2
```

```
[944]: a
```

```
[944]: array([13,  4, 23, 12,  1, 24,  8, 20, 10, 23, 24, 16, 16,  4, 11, 13, 15,
          25,  9, 12, 23, 12,  6, 24, 16,  2, 28,  7, 18, 11, 23, 18, 23,  9,
           8, 17, 27, 20,  8,  4, 13, 28, 20,  6,  2, 27, 25, 24, 27, 17, 27,
           5,  4, 11, 22,  9, 18,  1, 16, 10, 26, 27, 11, 12, 26,  2, 12,  4,
           3, 22,  9, 17, 25, 25, 17, 19,  2,  9, 20,  6, 23, 15, 22,  5,  3,
          14, 15, 20,  6, 19, 23,  2, 27, 28, 16,  2, 10,  1, 23,  6])
```

```
[968]: np.where(a%110,0,a)
```

```
[968]: 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])
```

```
[984]: a=np.random.randint(1,50,10)
```

```
[986]: a
```

```
[986]: array([44, 38, 42, 31,  3, 37, 11, 26, 19, 33])
```

```
[988]: a
```

```
[988]: array([44, 38, 42, 31,  3, 37, 11, 26, 19, 33])
```

```
[994]: a=np.sort(a)
```

```
[996]: a
```

```
[996]: array([ 3, 11, 19, 26, 31, 33, 37, 38, 42, 44])
```

```
[998]: a
```

```
[998]: array([ 3, 11, 19, 26, 31, 33, 37, 38, 42, 44])
```

```
[1000]: a.percentile(25)
```

```
-----
AttributeError                                Traceback (most recent call last)
Cell In[1000], line 1
----> 1 a.percentile(25)

AttributeError: 'numpy.ndarray' object has no attribute 'percentile'
```

```
[1014]: np.percentile(a,45+5+1+49)
```

```
[1014]: 44.0
```

[]: