```
Python 3.9.0 (tags/v3.9.0:9cf6752, Oct  5 2020, 15:34:40) [MSC v.1927 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> import numpy as np
>>> a=np.arange(4)
>>> a
array([0, 1, 2, 3])
>>> a+=1
>>> a
array([1, 2, 3, 4])
>>> a-=1
>>> a
array([0, 1, 2, 3])
>>> a+=4
>>> a
array([4, 5, 6, 7])
>>> a*=2
>>> a
array([ 8, 10, 12, 14])
>>> a=np.arange(1,5)
>>> a
array([1, 2, 3, 4])
>>> np.sqrt(a)
array([1.       , 1.41421356, 1.73205081, 2.       ])
>>> np.log(a)
array([0.       , 0.69314718, 1.09861229, 1.38629436])
>>> np.sin(a)
array([ 0.84147098,  0.90929743,  0.14112001, -0.7568025 ])
>>> a=np.array([3.3,4.5,1.2,5.7,0.3])
>>> a.sum
<built-in method sum of numpy.ndarray object at 0x00000178FC248940>
>>> a.sum()
```

```
15.0
>>> a.min()
0.3
>>> a.max()
5.7
>>> a.mean()
3.0
>>> a.std()
2.0079840636817816
>>> a=np.arange(10,16)
>>> a
array([10, 11, 12, 13, 14, 15])
>>> a[4]
14
>>> a[-1]
15
>>> a[-6]
10
>>> a[[1,3,4]]
array([11, 13, 14])
>>> A=np.arange(10,19).reshape((3,3))
>>> A
array([[10, 11, 12],
       [13, 14, 15],
       [16, 17, 18]])
>>>
>>> A[1,2]
15
>>> a=np.arange(10,16)
>>> a
array([10, 11, 12, 13, 14, 15])
```

```
>>> a[1:5]
array([11, 12, 13, 14])
>>> a[1:5:2]
array([11, 13])
>>> a[::2]
array([10, 12, 14])
>>> a[:5:2]
array([10, 12, 14])
>>> a[:5:]
array([10, 11, 12, 13, 14])
>>> A=np.arange(10,19).reshape((3,3))
>>> A
array([[10, 11, 12],
       [13, 14, 15],
       [16, 17, 18]])
>>> A[0,:]
array([10, 11, 12])
>>> A[:,0]
array([10, 13, 16])
>>> A[1,:]
array([13, 14, 15])
>>> A[:,1]
array([11, 14, 17])
>>> A[1,:,1]
Traceback (most recent call last):
  File "<pyshell#46>", line 1, in <module>
    A[1,:,1]
IndexError: too many indices for array: array is 2-dimensional, but 3 were indexed
>>> A[0:2,0:2]
array([[10, 11],
       [13, 14]])
```

```
>>> A[[0,2],0:2]
array([[10, 11],
       [16, 17]])
>>> for i in a:
        print(i)


10
11
12
13
14
15
>>> for row in A:
        print(row)


[10 11 12]
[13 14 15]
[16 17 18]
>>> for item in A.flat:
        print(item)


10
11
12
13
14
15
16
```

```
17
18
>>> np.apply_along_axis(np.mean,axis=0,arr=A)
array([13., 14., 15.])
>>> np.apply_along_axis(np.std,axis=0,A)
SyntaxError: positional argument follows keyword argument
>>> np.apply_along_axis(np.std,axis=0,arr=A)
array([2.44948974, 2.44948974, 2.44948974])
>>> np.apply_along_axis(np.sum,axis=0,arr=A)
array([39, 42, 45])
>>> def foo(x)
SyntaxError: invalid syntax
>>> def foo(x):
        return(x/2)

>>> np.apply_along_axis(foo,axis=1,arr=A)
array([[5. , 5.5, 6. ],
    [6.5, 7. , 7.5],
    [8. , 8.5, 9. ]])
>>> A=np.random.random((4,4))
>>> A
array([[0.03394943, 0.42028541, 0.6267412 , 0.81553799],
    [0.71248128, 0.9336784 , 0.7577639 , 0.67414448],
    [0.33248653, 0.87753852, 0.77547161, 0.83274315],
    [0.51502117, 0.85325415, 0.41038994, 0.44227958]])
>>> A<0.5
array([[ True,  True, False, False],
    [False, False, False, False],
    [ True, False, False, False],
    [False, False,  True,  True]])
>>> A>0.5
```

```
array([[False, False,  True,  True],
       [ True,  True,  True,  True],
       [False,  True,  True,  True],
       [ True,  True, False, False]])
>>> A>0.5
array([[False, False,  True,  True],
       [ True,  True,  True,  True],
       [False,  True,  True,  True],
       [ True,  True, False, False]])
>>> A[A<0.5]
array([0.03394943, 0.42028541, 0.33248653, 0.41038994, 0.44227958])
>>> a=np.random.random(12)
>>> a
array([0.60246395, 0.96037489, 0.63686985, 0.4383235 , 0.49700488,
       0.54756318, 0.80053476, 0.15790189, 0.49706683, 0.00919821,
       0.52589892, 0.91147047])
>>> A=a.reshape(3,4)
>>> A
array([[0.60246395, 0.96037489, 0.63686985, 0.4383235 ],
       [0.49700488, 0.54756318, 0.80053476, 0.15790189],
       [0.49706683, 0.00919821, 0.52589892, 0.91147047]])
>>> a.shape=(3,4)
>>> a
array([[0.60246395, 0.96037489, 0.63686985, 0.4383235 ],
       [0.49700488, 0.54756318, 0.80053476, 0.15790189],
       [0.49706683, 0.00919821, 0.52589892, 0.91147047]])
>>> a=a.ravel()
>>> a
array([0.60246395, 0.96037489, 0.63686985, 0.4383235 , 0.49700488,
       0.54756318, 0.80053476, 0.15790189, 0.49706683, 0.00919821,
       0.52589892, 0.91147047])
```

```
>>> a.shape=(12)
>>> a
array([0.60246395, 0.96037489, 0.63686985, 0.4383235 , 0.49700488,
       0.54756318, 0.80053476, 0.15790189, 0.49706683, 0.00919821,
       0.52589892, 0.91147047])
>>> A.transpose()
array([[0.60246395, 0.49700488, 0.49706683],
       [0.96037489, 0.54756318, 0.00919821],
       [0.63686985, 0.80053476, 0.52589892],
       [0.4383235 , 0.15790189, 0.91147047]])
>>> A=np.ones((3,3))
>>> B=np.zeros((1,1))
>>> B=np.zeros((3,3))
>>> np.vstack((A,B))
array([[1., 1., 1.],
       [1., 1., 1.],
       [1., 1., 1.],
       [0., 0., 0.],
       [0., 0., 0.],
       [0., 0., 0.]])
>>> np.hstack((A,B))
array([[1., 1., 1., 0., 0., 0.],
       [1., 1., 1., 0., 0., 0.],
       [1., 1., 1., 0., 0., 0.]])
>>> a=np.arry([0,1,2])
Traceback (most recent call last):
  File "<pyshell#89>", line 1, in <module>
    a=np.arry([0,1,2])
  File "C:\Users\Aditya Shakya\AppData\Local\Programs\Python\Python39\lib\site-
packages\numpy\__init__.py", line 214, in __getattr__
    raise AttributeError("module {!r} has no attribute "
```

```
AttributeError: module 'numpy' has no attribute 'arry'
>>> a=np.array([0,1,2])
>>> b=np.array([3,4,5])
>>> c=np.array([6,7,8])
>>> np.column_stack((a,b,c))
array([[0, 3, 6],
       [1, 4, 7],
       [2, 5, 8]])
>>> np.row_stack((a,b,c))
array([[0, 1, 2],
       [3, 4, 5],
       [6, 7, 8]])
>>> A=np.arange(16).reshape((4,4))
>>> A
array([[ 0,  1,  2,  3],
       [ 4,  5,  6,  7],
       [ 8,  9, 10, 11],
       [12, 13, 14, 15]])
>>> [B,C]=np.hsplit(A,2)
>>> B
array([[ 0,  1],
       [ 4,  5],
       [ 8,  9],
       [12, 13]])
>>> C
array([[ 2,  3],
       [ 6,  7],
       [10, 11],
       [14, 15]])
>>> [B,C]=np.vsplit(A,2)
>>> B
```

```
array([[0, 1, 2, 3],
       [4, 5, 6, 7]])
>>> C
array([[ 8,  9, 10, 11],
       [12, 13, 14, 15]])
>>> [A1,A2,A3]=np.split(A,[1,3],axis=1)
>>> A1
array([[ 0],
       [ 4],
       [ 8],
       [12]])
>>> A2
array([[ 1,  2],
       [ 5,  6],
       [ 9, 10],
       [13, 14]])
>>> A3
array([[ 3],
       [ 7],
       [11],
       [15]])
>>> [A1,A2,A3]=np.split(A,[1,3],axis=0)
>>> A1
array([[0, 1, 2, 3]])
>>> A2
array([[ 4,  5,  6,  7],
       [ 8,  9, 10, 11]])
>>> A3
array([[12, 13, 14, 15]])
>>> a=np.array([1,2,3,4])
>>> b=a
```

```
>>> b
array([1, 2, 3, 4])
>>> a[2]=0
>>> b
array([1, 2, 0, 4])
>>> c=a[0:2]
>>> c
array([1, 2])
>>> a[0]=0
>>> c
array([0, 2])
>>> a=np.array([1,2,3,4])
>>> c=a.copy()
>>> c
array([1, 2, 3, 4])
>>> a[0]=0
>>> c
array([1, 2, 3, 4])
>>> A=np.arange(16).reshape(4,4)
>>> b=np.arange(4)
>>> A
array([[ 0,  1,  2,  3],
       [ 4,  5,  6,  7],
       [ 8,  9, 10, 11],
       [12, 13, 14, 15]])
>>> b
array([0, 1, 2, 3])
>>> b*
SyntaxError: invalid syntax
>>> b*=b
>>> b
```

```
array([0, 1, 4, 9])
>>> b
array([0, 1, 4, 9])
>>> b=np.arange(4)
>>> b
array([0, 1, 2, 3])
>>> A+b
array([[ 0,  2,  4,  6],
       [ 4,  6,  8, 10],
       [ 8, 10, 12, 14],
       [12, 14, 16, 18]])
>>> m=np.arange(6).reshape(3,1,2)
>>> n=np.arange(6).reshape(3,2,1)
>>> ,
SyntaxError: invalid syntax
>>> m
array([[[0, 1]],

       [[2, 3]],

       [[4, 5]]])
>>> n
array([[[0],
        [1]],

       [[2],
        [3]],

       [[4],
        [5]]])
>>> m*
```

```
SyntaxError: invalid syntax
>>> m+n
array([[[ 0,  1],
        [ 1,  2]],

       [[ 4,  5],
        [ 5,  6]],

       [[ 8,  9],
        [ 9, 10]]])
>>> structured=np.array([(1,'First',0.5,1+2j),(2,'Second',1.3,2-
2j),(3,'Third',0.8,1+3j)],dtype=('i2,a6,f4,c8'))
>>> structured
array([(1, b'First', 0.5, 1.+2.j), (2, b'Second', 1.3, 2.-2.j),
       (3, b'Third', 0.8, 1.+3.j)],
      dtype=[('f0', '<i2'), ('f1', 'S6'), ('f2', '<f4'), ('f3', '<c8')])
>>> structured[1]
(2, b'Second', 1.3, 2.-2.j)
>>> structured['f1']
array([b'First', b'Second', b'Third'], dtype='|S6')
>>>
```