In [3]:
```
import numpy as np
print(np.version)
```
```
<module 'numpy.version' from 'C:\\Users\\Mounika\\anaconda\\lib\\site-packages\\numpy\\version.py'>
```

In [1]:
```
import numpy as np
array1=np.array([10,20,30])
array1
```
Out[1]:
```
array([10, 20, 30])
```

In [3]:
```
#creating 1-D array
array2=np.array([5,-7.4,'a',7.2])
array2
```
Out[3]:
```
array(['5', '-7.4', 'a', '7.2'], dtype='<U32')
```

In [13]:
```
#creating2D array
array3=np.array([[2.4,3],[4.91,7],[0,-1]])
print(array3)
```
```
[[ 2.4   3.  ]
 [ 4.91  7.  ]
 [ 0.   -1.  ]]
```

In [14]:
```
print(array1.ndim)
print(array3.ndim)
```
```
1
2
```

In [3]:
```
print(array1.shape)
print(array3.shape)
```
```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-3-24e5069ff465> in <module>
----> 1 print(array1.shape)
      2 print(array3.shape)
      3 print(array1.size)
      4 print(array3.size)

NameError: name 'array1' is not defined
```

In [4]:
```
import numpy as np
array1=np.array([10,20,30])
array1
```
Out[4]:
```
array([10, 20, 30])
```

In [5]:
```
#creating 1-D array
array2=np.array([5,-7.4,'a',7.2])
array2
#creating2D array
array3=np.array([[2.4,3],[4.91,7],[0,-1]])
print(array3)
```
```
[[ 2.4   3.  ]
 [ 4.91  7.  ]
 [ 0.   -1.  ]]
```

In [6]:
```
print(array1.size)
print(array3.size)
```
```
3
6
```

In [11]:
```
print(array1.dtype)
print(array3.dtype)
print(array2.dtype)
```
```
int32
float64
<U32
```

In [8]:
```
array3.itemsize
```
Out[8]:
```
8
```

In [9]:
```
array1.itemsize
```
Out[9]:
```
4
```

In [10]:
```
array2.itemsize
```
Out[10]:
```
128
```

In [12]:
```
array4=np.array([[1,2],[3,4],[5,6]],dtype=float)
array4
```
Out[12]:
```
array([[1., 2.],
       [3., 4.],
       [5., 6.]])
```

In [14]:
```
array5=np.zeros((3,4))
array5
```
Out[14]:
```
array([[0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.]])
```

In [15]:
```
array6=np.ones((2,3))
array6
```
Out[15]:
```
array([[1., 1., 1.],
       [1., 1., 1.]])
```

In [16]:
```
array7=np.arange(8)
array7
```
Out[16]:
```
array([0, 1, 2, 3, 4, 5, 6, 7])
```

In [18]:
```
array8=np.arange(-2,20,2)
array8
```
Out[18]:
```
array([-2,  0,  2,  4,  6,  8, 10, 12, 14, 16, 18])
```

In [19]:
```
array8[4]
```
Out[19]:
```
6
```

In [21]:
```
array3[1,1]
```
Out[21]:
```
7.0
```

In [22]:
```
array8[2:6]
```
Out[22]:
```
array([2, 4, 6, 8])
```

In [24]:
```
array8[:-4]
```
Out[24]:
```
array([-2,  0,  2,  4,  6,  8, 10])
```

In [25]:
```
array8[3:]
```
Out[25]:
```
array([ 4,  6,  8, 10, 12, 14, 16, 18])
```

In [28]:
```
array3[0:1,0:1]
```
Out[28]:
```
array([[2.4]])
```

In [30]:
```
array3+array4
```
Out[30]:
```
array([[ 3.4 ,  5.  ],
       [ 7.91, 11.  ],
       [ 5.  ,  5.  ]])
```

In [31]:
```
array3-array4
```
Out[31]:
```
array([[ 1.4 ,  1.  ],
       [ 1.91,  3.  ],
       [-5.  , -7.  ]])
```

In [32]:
```
array3*array4
```
Out[32]:
```
array([[ 2.4 ,  6.  ],
       [14.73, 28.  ],
       [ 0.  , -6.  ]])
```

In [33]:
```
array3@array4#matrix multiplication
```
```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-33-c9531c9763f1> in <module>
----> 1 array3@array4#matrix multiplication

ValueError: matmul: Input operand 1 has a mismatch in its core dimension 0, with gufunc signature (n?,k),(k,m?)->(n?,m?) (size 3 is different from 2)
```

In [34]:
```
array3**array4
```
Out[34]:
```
array([[2.40000000e+00, 9.00000000e+00],
       [1.18370771e+02, 2.40100000e+03],
       [0.00000000e+00, 1.00000000e+00]])
```

In [35]:
```
array3/array4
```
Out[35]:
```
array([[ 2.4       ,  1.5       ],
       [ 1.63666667,  1.75      ],
       [ 0.        , -0.16666667]])
```

In [36]:
```
array3%array4
```
Out[36]:
```
array([[0.4 , 1.  ],
       [1.91, 3.  ],
       [0.  , 5.  ]])
```

In [41]:
```
array8.sort()
array8
```
Out[41]:
```
array([-2,  0,  2,  4,  6,  8, 10, 12, 14, 16, 18])
```

In [43]:
```
array3.sort()
array3
```
Out[43]:
```
array([[ 2.4 ,  3.  ],
       [ 4.91,  7.  ],
       [-1.  ,  0.  ]])
```

In [45]:
```
array3.sort(axis=0)
array3
```
Out[45]:
```
array([[-1.  ,  0.  ],
       [ 2.4 ,  3.  ],
       [ 4.91,  7.  ]])
```

In [46]:
```
np.concatenate((array3,array4),axis=1)
```
Out[46]:
```
array([[-1.  ,  0.  ,  1.  ,  2.  ],
       [ 2.4 ,  3.  ,  3.  ,  4.  ],
       [ 4.91,  7.  ,  5.  ,  6.  ]])
```

In [23]:
```
array3=np.array([[1,2],[3,4],[5,6]],dtype=float)
array4=np.array([[1,2],[3,4],[5,6]],dtype=float)
print(np.hstack((array3,array4)))
print(np.vstack((array3,array4)))
```
```
[[1. 2. 1. 2.]
 [3. 4. 3. 4.]
 [5. 6. 5. 6.]]
[[1. 2.]
 [3. 4.]
 [5. 6.]
 [1. 2.]
 [3. 4.]
 [5. 6.]]
```

In [47]:
```
array3.reshape(2,3)
```
Out[47]:
```
array([[-1.  ,  0.  ,  2.4 ],
       [ 3.  ,  4.91,  7.  ]])
```

In [10]:
```
array4=np.array([[1,2],[3,4],[5,6]],dtype=float)
array4
```
Out[10]:
```
array([[1., 2.],
       [3., 4.],
       [5., 6.]])
```

In [13]:
```
first,second,third=np.array_split(array4,3)
first
```
Out[13]:
```
array([[1., 2.]])
```

In [14]:
```
second
```
Out[14]:
```
array([[3., 4.]])
```

In [15]:
```
third
```
Out[15]:
```
array([[5., 6.]])
```

In [31]:
```
array3=np.array([[2.4,3],[4.91,7],[0,-1]])
x=np.split(array3,1)
x
```
Out[31]:
```
[array([[ 2.4 ,  3.  ],
        [ 4.91,  7.  ],
        [ 0.  , -1.  ]])]
```

In [29]:
```
np.hsplit(array3,2)
```
Out[29]:
```
[array([[2.4 ],
        [4.91],
        [0.  ]]),
 array([[ 3.],
        [ 7.],
        [-1.]])]
```

In [37]:
```
x=np.linalg.inv(array4)
```
```
---------------------------------------------------------------------------
LinAlgError                               Traceback (most recent call last)
<ipython-input-37-7b17efaed36f> in <module>
----> 1 x=np.linalg.inv(array4)

<__array_function__ internals> in inv(*args, **kwargs)

~\anaconda\lib\site-packages\numpy\linalg\linalg.py in inv(a)
    539     a, wrap = _makearray(a)
    540     _assert_stacked_2d(a)
--> 541     _assert_stacked_square(a)
    542     t, result_t = _commonType(a)
    543

~\anaconda\lib\site-packages\numpy\linalg\linalg.py in _assert_stacked_square(*arrays)
    202         m, n = a.shape[-2:]
    203         if m != n:
--> 204             raise LinAlgError('Last 2 dimensions of the array must be square')
    205
    206 def _assert_finite(*arrays):

LinAlgError: Last 2 dimensions of the array must be square
```

In [36]:
```
x=array3.flatten()
print(x)
x=np.transpose(array3)
print(x)
```
```
[ 2.4   3.    4.91  7.    0.   -1.  ]
[[ 2.4   4.91  0.  ]
 [ 3.    7.   -1.  ]]
[[ 2.4   4.91  0.  ]
 [ 3.    7.   -1.  ]]
```

In [19]:
```
array4.max()
```
Out[19]:
```
6.0
```

In [21]:
```
array4.max(axis=1)
```
Out[21]:
```
array([2., 4., 6.])
```

In [22]:
```
array4.min()
```
Out[22]:
```
1.0
```

In [23]:
```
array4.mean()
```
Out[23]:
```
3.5
```

In [24]:
```
array4.std()
```
Out[24]:
```
1.707825127659933
```

In [37]:
```
student_data=np.genfromtxt('C:/Desktop/DSP progrms/data.txt',dtype=int)
student_data
```
```
---------------------------------------------------------------------------
FileNotFoundError                         Traceback (most recent call last)
<ipython-input-37-3c02d017ae07> in <module>
----> 1 student_data=np.genfromtxt('C:/Desktop/DSP progrms/data.txt',dtype=int)
      2 student_data

~\anaconda\lib\site-packages\numpy\lib\npyio.py in genfromtxt(fname, dtype, comments, delimiter, skip_header, skip_footer, converters, missing_values, filling_values, usecols, names, excludelist, deletechars, replace_space, autos
trip, case_sensitive, defaultfmt, unpack, usemask, loose, invalid_raise, max_rows, encoding)
   1747                 fname = os_fspath(fname)
   1748             if isinstance(fname, str):
-> 1749                 fid = np.lib._datasource.open(fname, 'rt', encoding=encoding)
   1750                 fid_ctx = contextlib.closing(fid)
   1751             else:

~\anaconda\lib\site-packages\numpy\lib\_datasource.py in open(path, mode, destpath, encoding, newline)
    193
    194     ds = DataSource(destpath)
--> 195     return ds.open(path, mode, encoding=encoding, newline=newline)
    196
    197

~\anaconda\lib\site-packages\numpy\lib\_datasource.py in open(self, path, mode, encoding, newline)
    530             if ext == 'bz2':
    531                 mode.replace("+", "")
--> 532             return _file_openers[ext](found, mode=mode,
    533                                       encoding=encoding, newline=newline)
    534         else:

FileNotFoundError: [Errno 2] No such file or directory: 'C:/Desktop/DSP progrms/data.txt'
```

In [40]:
```
a=np.array([1,2,3,4,5])
x=a.copy()
a[0]=20
print(a)
print(x)
```
```
[20  2  3  4  5]
[1 2 3 4 5]
```

In [41]:
```
y=a.view()
print(a)
print(y)
```
```
[20  2  3  4  5]
[20  2  3  4  5]
```

In [42]:
```
print(x.base)
print(y.base)
```
```
None
[20  2  3  4  5]
```

In [43]:
```
x=np.where(a==4)
print(x)
```
```
(array([3], dtype=int64),)
```

In [49]:
```
x=np.searchsorted(a,4)
print(x)
```
```
3
```

In [45]:
```
a
```
Out[45]:
```
array([20,  2,  3,  4,  5])
```

In [46]:
```
x
```
Out[46]:
```
5
```

In [48]:
```
x=np.searchsorted(a,3,side='right')
x
```
Out[48]:
```
3
```

In [50]:
```
x=np.searchsorted(a,[3,5,4,7])
print(x)
```
```
[2 4 3 5]
```

In [55]:
```
filter_array=[]
for i in a:
    if i>2:
        filter_array.append(True)
    else:
        filter_array.append(False)
newarr=a[filter_array]
print(filter_array)
print(newarr)
```
```
[True, False, True, True, True]
[20  3  4  5]
```

In [54]:
```
filter_array=a>2
newarr=a[filter_array]
print(filter_array)
print(newarr)
```
```
[ True False  True  True  True]
[20  3  4  5]
```

In [57]:
```
from numpy import random
x=random.randint(1000)
print(x)
```
```
685
```

In [58]:
```
x=random.randint(100,size=(5))
print(x)
```
```
[51 47 54 18 86]
```

In [59]:
```
x=random.randint(100,size=(5,3))
print(x)
```
```
[[81  7 14]
 [20 87 28]
 [96 92 10]
 [38 13 27]
 [51 52 89]]
```

In [60]:
```
x=random.choice([3,4,5,8,9])
print(x)
```
```
8
```

In [1]:
```
import numpy as np
a=np.array([[1,2,3,4],[3,7,8,9],[6,8,4,9]])
print(a)
```
```
[[1 2 3 4]
 [3 7 8 9]
 [6 8 4 9]]
```

In [2]:
```
a1=np.arange(7)
a2=a1[np.newaxis,:]
print(a2)
```
```
[[0 1 2 3 4 5 6]]
```

In [3]:
```
print(a2.shape)
```
```
(1, 7)
```

In [4]:
```
print(np.zeros(3))
```
```
[0. 0. 0.]
```

In [5]:
```
np.zeros(3)
```
Out[5]:
```
array([0., 0., 0.])
```

In [6]:
```
np.ones(3)
```
Out[6]:
```
array([1., 1., 1.])
```

In [7]:
```
np.empty(6)
```
Out[7]:
```
array([0., 0., 0., 0., 0., 0.])
```

In [8]:
```
np.arange(4)
```
Out[8]:
```
array([0, 1, 2, 3])
```

In [9]:
```
np.arange(2,6,1)
```
Out[9]:
```
array([2, 3, 4, 5])
```

In [5]:
```
np.linspace(0,2,9)
```
Out[5]:
```
array([0.  , 0.25, 0.5 , 0.75, 1.  , 1.25, 1.5 , 1.75, 2.  ])
```

In [11]:
```
x=np.ones(3,dtype=np.int64)
x
```
Out[11]:
```
array([1, 1, 1], dtype=int64)
```

In [12]:
```
a=np.array([4,8,7,5,9,7,2])
np.searchsorted(a,7)
```
Out[12]:
```
4
```

In [13]:
```
np.argsort(a)
```
Out[13]:
```
array([6, 0, 3, 2, 5, 1, 4], dtype=int64)
```

In [14]:
```
np.lexsort(a)
```
Out[14]:
```
0
```

In [15]:
```
np.partition(a,1)
```
Out[15]:
```
array([2, 4, 7, 5, 9, 7, 8])
```

In [16]:
```
a2=np.array([5,7,9,7])
np.concatenate((a,a2))
```
Out[16]:
```
array([4, 8, 7, 5, 9, 7, 2, 5, 7, 9, 7])
```

In [17]:
```
np.concatenate((a,a2),axis=0)
```
Out[17]:
```
array([4, 8, 7, 5, 9, 7, 2, 5, 7, 9, 7])
```

In [18]:
```
a=np.array([[1,2,3,4],[3,7,8,9],[6,8,4,9]])
a.ndim
```
Out[18]:
```
2
```

In [15]:
```
a.astype(float)
```
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-15-14e733e816cf> in <module>
----> 1 a.astype(float)

AttributeError: 'int' object has no attribute 'astype'
```

In [19]:
```
a.size
```
Out[19]:
```
12
```

In [20]:
```
a.shape
```
Out[20]:
```
(3, 4)
```

In [21]:
```
b=a2.reshape(2,2)
b
```
Out[21]:
```
array([[5, 7],
       [9, 7]])
```

In [14]:
```
a=np.random.randint(1,10)
print(a)
```
```
8
```

In [20]:
```
np.delete(a,1)
```
```
---------------------------------------------------------------------------
IndexError                                Traceback (most recent call last)
<ipython-input-20-2788828f7483> in <module>
----> 1 np.delete(a,1)

<__array_function__ internals> in delete(*args, **kwargs)

~\anaconda\lib\site-packages\numpy\lib\function_base.py in delete(arr, obj, axis)
   4375         # optimization for a single value
   4376         if (obj < -N or obj >= N):
-> 4377             raise IndexError(
   4378                 "index %i is out of bounds for axis %i with "
   4379                 "size %i" % (obj, axis, N))

IndexError: index 1 is out of bounds for axis 0 with size 1
```

In [38]:
```
print(array4.corrcoef())
```
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-38-b2dd5f7ea116> in <module>
----> 1 print(array4.corrcoef())

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

In [40]:
```
np.cumsum(array4)
```
Out[40]:
```
array([ 1.,  3.,  6., 10., 15., 21.])
```

In [64]:
```
print(np.all(array4))
print(np.any(array4))
print(np.isfinite(array4))
print(np.isinf(array4))
print(np.greater(array3,array4))
print(np.identity(3))
print(np.random.normal(0,1,1))
print(np.diag([1,2,3,4,5]))
```
```
True
True
[[ True  True]
 [ True  True]
 [ True  True]]
[[False False]
 [False False]
 [False False]]
[[ True  True]
 [ True  True]
 [False False]]
[[1. 0. 0.]
 [0. 1. 0.]
 [0. 0. 1.]]
[1.39269436]
[[1 0 0 0 0]
 [0 2 0 0 0]
 [0 0 3 0 0]
 [0 0 0 4 0]
 [0 0 0 0 5]]
```

In [51]:
```
array4[0:3,1:]
```
Out[51]:
```
array([[2.],
       [4.],
       [6.]])
```

In [65]:
```
array4[::-1]
```
Out[65]:
```
array([[5., 6.],
       [3., 4.],
       [1., 2.]])
```

In [72]:
```
x=np.zeros((4,4))
print(x)
x[0::1,::1]=1
x[::1,0::2]=1
print(x)
```
```
[[0. 0. 0. 0.]
 [0. 0. 0. 0.]
 [0. 0. 0. 0.]
 [0. 0. 0. 0.]]
[[1. 1. 1. 1.]
 [1. 1. 1. 1.]
 [1. 1. 1. 1.]
 [1. 1. 1. 1.]]
```

In [76]:
```
x=np.random.random((3,3,3))
print(x)
```
```
[[[0.03362352 0.41246778 0.32797904]
  [0.28059504 0.03657152 0.02266734]
  [0.20527321 0.24770048 0.43392673]]

 [[0.15768331 0.27490156 0.0242568 ]
  [0.9735924  0.28468475 0.7673073 ]
  [0.69668999 0.0638393  0.77052647]]

 [[0.33947792 0.88906912 0.57105252]
  [0.17019992 0.35527582 0.40379973]
  [0.18724143 0.89131987 0.73984756]]]
```

In [ ]: