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

In [2]:
```
a=np.array((5,6,7,8,9))
```

In [3]:
```
a
```

Out[3]:
```
array([5, 6, 7, 8, 9])
```

In [4]:
```
a.dtype
```

Out[4]:
```
dtype('int32')
```

In [5]:
```
a.itemsize
```

Out[5]:
```
4
```

In [6]:
```
a=np.array([[5,6,7,8,9],[2,4,5,3,5]])
```

In [7]:
```
a
```

Out[7]:
```
array([[5, 6, 7, 8, 9],
       [2, 4, 5, 3, 5]])
```

In [ ]:
```

```

In [8]:
```
a.ndim
```

Out[8]:
```
2
```

In [9]:
```
b=np.arange(6)
```

In [10]:
```
b
```

Out[10]:
```
array([0, 1, 2, 3, 4, 5])
```

In [11]:
```
b.shape
```

Out[11]:
```
(6,)
```

In [12]:
```
c=np.array([[5,6,7,8,9,4],[2,4,5,3,5,7],[3,5,6,78,34,8]])
```

In [13]:
```
c
```

Out[13]:
```
array([[ 5,  6,  7,  8,  9,  4],
       [ 2,  4,  5,  3,  5,  7],
       [ 3,  5,  6, 78, 34,  8]])
```

In [14]:
```
c.shape
```

Out[14]:
```
(3, 6)
```

In [15]:
```
c.reshape(9,2)
```

Out[15]:
```
array([[ 5,  6],
       [ 7,  8],
       [ 9,  4],
       [ 2,  4],
       [ 5,  3],
       [ 5,  7],
       [ 3,  5],
       [ 6, 78],
       [34,  8]])
```

In [16]:
```
c[1,1:5]
```

Out[16]:
```
array([4, 5, 3, 5])
```

In [17]:
```
c*10
```

Out[17]:
```
array([[ 50,  60,  70,  80,  90,  40],
       [ 20,  40,  50,  30,  50,  70],
       [ 30,  50,  60, 780, 340,  80]])
```

In [18]:
```
c+10
```

Out[18]:
```
array([[15, 16, 17, 18, 19, 14],
       [12, 14, 15, 13, 15, 17],
       [13, 15, 16, 88, 44, 18]])
```

In [19]:
```
c**2
```

Out[19]:
```
array([[  25,   36,   49,   64,   81,   16],
       [   4,   16,   25,    9,   25,   49],
       [   9,   25,   36, 6084, 1156,   64]], dtype=int32)
```

In [20]:
```
np.sqrt(c)
```

Out[20]:
```
array([[2.23606798, 2.44948974, 2.64575131, 2.82842712, 3.        ,
        2.        ],
       [1.41421356, 2.        , 2.23606798, 1.73205081, 2.23606798,
        2.64575131],
       [1.73205081, 2.23606798, 2.44948974, 8.83176087, 5.83095189,
        2.82842712]])
```

In [21]:
```
np.cbrt(c)
```

Out[21]:
```
array([[1.70997595, 1.81712059, 1.91293118, 2.        , 2.08008382,
        1.58740105],
       [1.25992105, 1.58740105, 1.70997595, 1.44224957, 1.70997595,
        1.91293118],
       [1.44224957, 1.70997595, 1.81712059, 4.27265868, 3.2396118 ,
        2.        ]])
```

In [22]:
```
c.sum()
```

Out[22]:
```
199
```

In [23]:
```
c.sum(axis=0)
```

Out[23]:
```
array([10, 15, 18, 89, 48, 19])
```

In [24]:
```
c.sum(axis=1)
```

Out[24]:
```
array([ 39,  26, 134])
```

In [25]:
```
m=np.array([[15, 16, 17, 18, 19, 14],[34,45,34,342,23,12]])
p=np.array([[67,889,34,324,34,67],[78,34,32,56,76,345]])
```

In [26]:
```
m+p
```

Out[26]:
```
array([[ 82, 905,  51, 342,  53,  81],
       [112,  79,  66, 398,  99, 357]])
```

In [27]:
```
np.stack((m,p))
```

Out[27]:
```
array([[[ 15,  16,  17,  18,  19,  14],
        [ 34,  45,  34, 342,  23,  12]],

       [[ 67, 889,  34, 324,  34,  67],
        [ 78,  34,  32,  56,  76, 345]]])
```

In [28]:
```
np.stack((m,p),axis=0)
```

Out[28]:
```
array([[[ 15,  16,  17,  18,  19,  14],
        [ 34,  45,  34, 342,  23,  12]],

       [[ 67, 889,  34, 324,  34,  67],
        [ 78,  34,  32,  56,  76, 345]]])
```

In [29]:
```
np.stack((m,p),axis=1)
```

Out[29]:
```
array([[[ 15,  16,  17,  18,  19,  14],
        [ 67, 889,  34, 324,  34,  67]],

       [[ 34,  45,  34, 342,  23,  12],
        [ 78,  34,  32,  56,  76, 345]]])
```

In [30]:
```
np.stack((m,p),axis=1).shape
```

Out[30]:
```
(2, 2, 6)
```

In [31]:
```
np.vstack((m,p))
```

Out[31]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12],
       [ 67, 889,  34, 324,  34,  67],
       [ 78,  34,  32,  56,  76, 345]])
```

In [32]:
```
m,p
```

Out[32]:
```
(array([[ 15,  16,  17,  18,  19,  14],
        [ 34,  45,  34, 342,  23,  12]]),
 array([[ 67, 889,  34, 324,  34,  67],
        [ 78,  34,  32,  56,  76, 345]]))
```

In [33]:
```
np.hstack((m,p))
```

Out[33]:
```
array([[ 15,  16,  17,  18,  19,  14,  67, 889,  34, 324,  34,  67],
       [ 34,  45,  34, 342,  23,  12,  78,  34,  32,  56,  76, 345]])
```

In [34]:
```
np.hstack((m,p)).shape
```

Out[34]:
```
(2, 12)
```

In [35]:
```
np.dstack((m,p))
```

Out[35]:
```
array([[[ 15,  67],
        [ 16, 889],
        [ 17,  34],
        [ 18, 324],
        [ 19,  34],
        [ 14,  67]],

       [[ 34,  78],
        [ 45,  34],
        [ 34,  32],
        [342,  56],
        [ 23,  76],
        [ 12, 345]]])
```

In [36]:
```
np.concatenate((m,p))
```

Out[36]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12],
       [ 67, 889,  34, 324,  34,  67],
       [ 78,  34,  32,  56,  76, 345]])
```

In [37]:
```
np.concatenate((m,p),axis=0)
```

Out[37]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12],
       [ 67, 889,  34, 324,  34,  67],
       [ 78,  34,  32,  56,  76, 345]])
```

In [38]:
```
np.concatenate((m,p),axis=1)
```

Out[38]:
```
array([[ 15,  16,  17,  18,  19,  14,  67, 889,  34, 324,  34,  67],
       [ 34,  45,  34, 342,  23,  12,  78,  34,  32,  56,  76, 345]])
```

In [39]:
```
m
```

Out[39]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12]])
```

In [40]:
```
np.array_split(m,10)
```

Out[40]:
```
[array([[15, 16, 17, 18, 19, 14]]),
 array([[ 34,  45,  34, 342,  23,  12]]),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32),
 array([], shape=(0, 6), dtype=int32)]
```

In [41]:
```
m
```

Out[41]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12]])
```

In [42]:
```
np.where(m==18)
```

Out[42]:
```
(array([0], dtype=int64), array([3], dtype=int64))
```

In [43]:
```
u=np.array([[3,5,5,6,5,2,87],[2,5,897,34,32,657,34]])
```

In [44]:
```
u
```

Out[44]:
```
array([[  3,   5,   5,   6,   5,   2,  87],
       [  2,   5, 897,  34,  32, 657,  34]])
```

In [45]:
```
np.where(u==5)
```

Out[45]:
```
(array([0, 0, 0, 1], dtype=int64), array([1, 2, 4, 1], dtype=int64))
```

In [46]:
```
np.where(u%2==0)
```

Out[46]:
```
(array([0, 0, 1, 1, 1, 1], dtype=int64),
 array([3, 5, 0, 3, 4, 6], dtype=int64))
```

In [47]:
```
mark=np.array([  3,   5,   5,   6,   5,   2,  87])
```

In [48]:
```
mark
```

Out[48]:
```
array([ 3,  5,  5,  6,  5,  2, 87])
```

In [49]:
```
max(mark)
```

Out[49]:
```
87
```

In [50]:
```
min(mark)
```

Out[50]:
```
2
```

In [51]:
```
mark[mark>=35]
```

Out[51]:
```
array([87])
```

In [52]:
```
from numpy import random
```

In [53]:
```
np.random.randint(200)
```

Out[53]:
```
59
```

In [54]:
```
np.random.randint(200,500)
```

Out[54]:
```
380
```

In [55]:
```
np.random.randint(300,size=10)
```

Out[55]:
```
array([135, 233,  72, 253, 126, 246, 124, 177,  58, 291])
```

```
np.random.choice(mark)
```

In [56]:
```
np.random.choice(mark)
```

Out[56]:
```
87
```

In [57]:
```
m
```

Out[57]:
```
array([[ 15,  16,  17,  18,  19,  14],
       [ 34,  45,  34, 342,  23,  12]])
```

In [58]:
```
otp=np.random.randint(100000,1000000)
```

In [59]:
```
otp
```

Out[59]:
```
429690
```

In [ ]:
```

```