```
In [1]:
```

```
#Importing packages
import pandas as pd
import numpy as np
```

## In [2]:

```
# #TO create a DF
# 1.Determine the columns
# 2.Using for Loop and numpy generate some fake values
# 3.Create a empty Dataframe
```

## In [3]:

```
1 df=pd.DataFrame(columns=['COlumn1','COlumn2'])
```

#### In [4]:

```
1 df
```

## Out[4]:

#### COlumn1 COlumn2

## In [5]:

```
1 df['COlumn1']=np.random.choice([1,0],99)
```

## In [6]:

```
1 type(df)
```

#### Out[6]:

pandas.core.frame.DataFrame

```
In [7]:
```

1 df

# Out[7]:

	COlumn1	COlumn2
0	0	NaN
1	0	NaN
2	0	NaN
3	0	NaN
4	0	NaN
94	0	NaN
95	0	NaN
96	0	NaN
97	1	NaN

# In [8]:

```
1 df.iloc[1,1]=58
```

# In [9]:

1 df

# Out[9]:

	COlumn1	COlumn2
0	0	NaN
1	0	58
2	0	NaN
3	0	NaN
4	0	NaN
94	0	NaN
95	0	NaN
96	0	NaN
97	1	NaN
98	1	NaN

99 rows × 2 columns

```
In [10]:
```

```
1 df.iloc[0,1]=58
```

# In [11]:

1 df

# Out[11]:

	COlumn1	COlumn2
0	0	58
1	0	58
2	0	NaN
3	0	NaN
4	0	NaN
94	0	NaN
95	0	NaN
96	0	NaN
97	1	NaN
98	1	NaN

99 rows × 2 columns

## In [12]:

```
1 dic={'COlumn1':47,'COlumn2':57}
```

# In [13]:

```
1 new_df=pd.DataFrame(dic,index=[99])
```

# In [14]:

```
1 df=pd.concat([df,new_df])
```

```
In [15]:
```

1 df

# Out[15]:

	COlumn1	COlumn2
0	0	58
1	0	58
2	0	NaN
3	0	NaN
4	0	NaN
95	0	NaN
96	0	NaN
97	1	NaN
98	1	NaN
99	47	57

100 rows × 2 columns

## In [16]:

```
1 df['COlumn3']=np.arange(1,101,1)
```

# In [17]:

```
1 df
```

# Out[17]:

	COlumn1	COlumn2	COlumn3
0	0	58	1
1	0	58	2
2	0	NaN	3
3	0	NaN	4
4	0	NaN	5
95	0	NaN	96
96	0	NaN	97
97	1	NaN	98
98	1	NaN	99
99	47	57	100

100 rows × 3 columns

```
In [18]:
```

```
1 df['COlumn2'].fillna(df['COlumn2'].mean())
Out[18]:
0
      58.000000
1
      58.000000
2
      57.666667
3
      57.666667
      57.666667
95
      57.666667
96
      57.666667
97
      57.666667
98
      57.666667
99
      57.000000
Name: COlumn2, Length: 100, dtype: float64
In [19]:
```

```
df['COlumn2']=df['COlumn2'].fillna(df['COlumn2'].mean())
```

## In [20]:

```
1 df
```

## Out[20]:

	COlumn1	COlumn2	COlumn3
0	0	58.000000	1
1	0	58.000000	2
2	0	57.666667	3
3	0	57.666667	4
4	0	57.666667	5
95	0	57.666667	96
96	0	57.666667	97
97	1	57.666667	98
98	1	57.666667	99
99	47	57.000000	100

100 rows × 3 columns

```
In [21]:
```

```
1 df.isnull()
```

# Out[21]:

	COlumn1	COlumn2	COlumn3
0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	False
95	False	False	False
96	False	False	False
97	False	False	False
98	False	False	False
99	False	False	False

100 rows × 3 columns

## In [22]:

```
import math
math.floor(df['COlumn2'].mean())
```

# Out[22]:

57

# In [23]:

```
1 df.describe()
```

# Out[23]:

	COlumn1	COlumn2	COlumn3
count	100.000000	100.000000	100.000000
mean	0.940000	57.666667	50.500000
std	4.679247	0.082061	29.011492
min	0.000000	57.000000	1.000000
25%	0.000000	57.666667	25.750000
50%	0.000000	57.666667	50.500000
75%	1.000000	57.666667	75.250000
max	47.000000	58.000000	100.000000

```
In [24]:
```

```
1 df.info()
<class 'pandas.core.frame.DataFrame'>
Int64Index: 100 entries, 0 to 99
Data columns (total 3 columns):
    Column
             Non-Null Count Dtype
             -----
                             ----
0
    COlumn1 100 non-null
                              int64
    COlumn2 100 non-null
 1
                              float64
    COlumn3 100 non-null
                              int32
dtypes: float64(1), int32(1), int64(1)
memory usage: 2.7 KB
In [25]:
 1
    for x in df.index:
        print(x)
 2
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
In [26]:
 1 df.columns
```

# Out[26]:

```
Index(['COlumn1', 'COlumn2', 'COlumn3'], dtype='object')
```

```
In [27]:
```

```
1 df.index
```

```
Out[27]:
```

#### In [28]:

```
1 df['COlumn4']=np.random.choice(['AI&ML','AI&DA','CYS'],100)
```

#### In [29]:

```
1 a=np.random.choice(['AI&ML','AI&DA','CYS'],100)
```

#### In [30]:

```
1 a
```

#### Out[30]:

#### In [31]:

```
1 df['Column4']=a
```

# In [32]:

1 df

# Out[32]:

	COlumn1	COlumn2	COlumn3	COlumn4	Column4
0	0	58.000000	1	AI&ML	CYS
1	0	58.000000	2	CYS	AI&ML
2	0	57.666667	3	CYS	AI&DA
3	0	57.666667	4	CYS	AI&ML
4	0	57.666667	5	CYS	CYS
95	0	57.666667	96	CYS	CYS
96	0	57.666667	97	CYS	AI&ML
97	1	57.666667	98	CYS	AI&ML
98	1	57.666667	99	AI&DA	AI&ML
99	47	57.000000	100	AI&ML	AI&DA

100 rows × 5 columns

## In [33]:

```
1 df.loc[0,'Column4']="DA"
```

# In [34]:

1 df

# Out[34]:

	COlumn1	COlumn2	COlumn3	COlumn4	Column4
0	0	58.000000	1	AI&ML	DA
1	0	58.000000	2	CYS	AI&ML
2	0	57.666667	3	CYS	AI&DA
3	0	57.666667	4	CYS	AI&ML
4	0	57.666667	5	CYS	CYS
95	0	57.666667	96	CYS	CYS
96	0	57.666667	97	CYS	AI&ML
97	1	57.666667	98	CYS	AI&ML
98	1	57.666667	99	AI&DA	AI&ML
99	47	57.000000	100	AI&ML	AI&DA

100 rows × 5 columns

## Out[38]:

	COlumn1	COlumn2	COlumn3	COlumn4	Column4
0	0	58.000000	1	AI&ML	Artificial Intelligence & Data Analytics
1	0	58.000000	2	CYS	Artificial Intelligence & Machine Learning
2	0	57.666667	3	CYS	Artificial Intelligence & Data Analytics
3	0	57.666667	4	CYS	Artificial Intelligence & Machine Learning
4	0	57.666667	5	CYS	CYber Security
95	0	57.666667	96	CYS	CYber Security
96	0	57.666667	97	CYS	Artificial Intelligence & Machine Learning
97	1	57.666667	98	CYS	Artificial Intelligence & Machine Learning
98	1	57.666667	99	AI&DA	Artificial Intelligence & Machine Learning
99	47	57.000000	100	AI&ML	Artificial Intelligence & Data Analytics

100 rows × 5 columns

```
In [39]:
```

```
1 del df['COlumn4']
```

```
In [40]:
```

```
1 df
```

#### Out[40]:

	COlumn1	COlumn2	COlumn3	Column4
0	0	58.000000	1	Artificial Intelligence & Data Analytics
1	0	58.000000	2	Artificial Intelligence & Machine Learning
2	0	57.666667	3	Artificial Intelligence & Data Analytics
3	0	57.666667	4	Artificial Intelligence & Machine Learning
4	0	57.666667	5	CYber Security
95	0	57.666667	96	CYber Security
96	0	57.666667	97	Artificial Intelligence & Machine Learning
97	1	57.666667	98	Artificial Intelligence & Machine Learning
98	1	57.666667	99	Artificial Intelligence & Machine Learning
99	47	57.000000	100	Artificial Intelligence & Data Analytics

100 rows × 4 columns

#### In [41]:

#### In [42]:

```
1 df['Column5']=df['Column4'].map(dic)
```

## In [43]:

```
1 df['Column4']
```

#### Out[43]:

```
Artificial Intelligence & Data Analytics
0
1
      Artificial Intelligence & Machine Learning
2
        Artificial Intelligence & Data Analytics
3
      Artificial Intelligence & Machine Learning
4
                                  CYber Security
95
                                  CYber Security
     Artificial Intelligence & Machine Learning
96
      Artificial Intelligence & Machine Learning
97
98
      Artificial Intelligence & Machine Learning
        Artificial Intelligence & Data Analytics
99
Name: Column4, Length: 100, dtype: object
```

# In [44]:

1 df

# Out[44]:

	COlumn1	COlumn2	COlumn3	Column4	Column5
0	0	58.000000	1	Artificial Intelligence & Data Analytics	E03
1	0	58.000000	2	Artificial Intelligence & Machine Learning	E01
2	0	57.666667	3	Artificial Intelligence & Data Analytics	E03
3	0	57.666667	4	Artificial Intelligence & Machine Learning	E01
4	0	57.666667	5	CYber Security	E02
95	0	57.666667	96	CYber Security	E02
96	0	57.666667	97	Artificial Intelligence & Machine Learning	E01
97	1	57.666667	98	Artificial Intelligence & Machine Learning	E01
98	1	57.666667	99	Artificial Intelligence & Machine Learning	E01
99	47	57.000000	100	Artificial Intelligence & Data Analytics	E03

100 rows × 5 columns

## In [45]:

```
1 df=pd.read_clipboard()
```

# In [46]:

1 df

# Out[46]:

	1	67	1000
0	2	17	1547
1	5	96	2587
2	6	74	4586
3	3	38	3578
4	4	87	1486
5	8	54	5713
6	3	43	9841
7	4	23	2684
8	2	32	7513
9	4	23	9855
10	5	23	4521
11	3	12	1564

```
In [47]:
 1 df['new1']=df['1']/max(df['1'])
In [48]:
 1 df
Out[48]:
   1 67 1000 new1
 0 2 17 1547 0.250
 1 5 96 2587 0.625
 2 6 74 4586 0.750
 3 3 38 3578 0.375
   4 87 1486 0.500
 5 8 54 5713 1.000
 6 3 43 9841 0.375
 7 4 23 2684 0.500
 8 2 32 7513 0.250
 9 4 23 9855 0.500
10 5 23 4521 0.625
11 3 12 1564 0.375
```

## In [55]:

```
1 df['new2']=(df['67']-min(df['67']))/(max(df['67'])-min(df['67']))
```

## In [56]:

1 df

# Out[56]:

	1	67	1000	new1	new2	new3
0	2	17	1547	0.250	0.059524	-1.011055
1	5	96	2587	0.625	1.000000	-0.669207
2	6	74	4586	0.750	0.738095	-0.012135
3	3	38	3578	0.375	0.309524	-0.343465
4	4	87	1486	0.500	0.892857	-1.031106
5	8	54	5713	1.000	0.500000	0.358311
6	3	43	9841	0.375	0.369048	1.715186
7	4	23	2684	0.500	0.130952	-0.637323
8	2	32	7513	0.250	0.238095	0.949972
9	4	23	9855	0.500	0.130952	1.719788
10	5	23	4521	0.625	0.130952	-0.033500
11	3	12	1564	0.375	0.000000	-1.005467

# In [57]:

```
df['new3']=(df['1000']-(df['1000'].mean()))/((df['1000']).std())
```

# In [58]:

1 df

# Out[58]:

	1	67	1000	new1	new2	new3
0	2	17	1547	0.250	0.059524	-1.011055
1	5	96	2587	0.625	1.000000	-0.669207
2	6	74	4586	0.750	0.738095	-0.012135
3	3	38	3578	0.375	0.309524	-0.343465
4	4	87	1486	0.500	0.892857	-1.031106
5	8	54	5713	1.000	0.500000	0.358311
6	3	43	9841	0.375	0.369048	1.715186
7	4	23	2684	0.500	0.130952	-0.637323
8	2	32	7513	0.250	0.238095	0.949972
9	4	23	9855	0.500	0.130952	1.719788
10	5	23	4521	0.625	0.130952	-0.033500
11	3	12	1564	0.375	0.000000	-1.005467

3

```
In [59]:
 1 lst=[1,2,3,4,5,6]
 2 arr=np.array(1st)
In [60]:
 1 arr
Out[60]:
array([1, 2, 3, 4, 5, 6])
In [61]:
 1 arr=np.array([1,2,3,4,5,6,7])
In [62]:
 1 arr
Out[62]:
array([1, 2, 3, 4, 5, 6, 7])
In [63]:
 1 lst[2]
Out[63]:
```

#### In [65]:

1

<>:2: SyntaxWarning: list indices must be integers or slices, not tuple; p
erhaps you missed a comma?

<>:5: SyntaxWarning: list indices must be integers or slices, not tuple; p
erhaps you missed a comma?

<>:2: SyntaxWarning: list indices must be integers or slices, not tuple; p
erhaps you missed a comma?

<>:5: SyntaxWarning: list indices must be integers or slices, not tuple; p
erhaps you missed a comma?

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:2: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:5: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:2: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:5: SyntaxW arning: list indices must be integers or slices, not tuple; perhaps you mi ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:2: SyntaxW arning: list indices must be integers or slices, not tuple; perhaps you mi ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:5: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:2: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:5: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:2: SyntaxW
arning: list indices must be integers or slices, not tuple; perhaps you mi
ssed a comma?

[[1,2,4],[4,5,6,]]

C:\Users\klmar\AppData\Local\Temp\ipykernel\_28268\3096359092.py:5: SyntaxW arning: list indices must be integers or slices, not tuple; perhaps you mi ssed a comma?

[[1,2,4],[4,5,6,]]

```
Traceback (most recent call las
TypeError
t)
Input In [65], in <cell line: 2>()
      1 arr=[[
----> 2
In [68]:
            [[1,2,4],[4,5,6,]]
            [[4,2,3],[1,7,8]]
             [1,2,4],[4,5,6,]]
            [[4,2,3],[1,7,8]]]]
Out[689:
(pegrag:5)ist indices must be integers or slices, not tuple
In [66]:
 1 | arr=np.arange(0,100).reshape(2,5,2,5)
In [67]:
 1 arr
Out[67]:
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]]]])
```

```
In [ ]:
```

```
1 2,5,2,5
```

## In [69]:

```
1 arr[0]
```

## Out[69]:

# In [70]:

1 arr.shape

## Out[70]:

(2, 5, 2, 5)

```
In [74]:
```

```
1 arr
```

```
Out[74]:
```

```
array([[[[495, 339, 476],
         [371, 409, 334],
         [232, 324, 484],
         [397, 325, 231]],
        [[251, 496, 264],
         [377, 301, 443],
         [388, 434, 271],
         [228, 394, 295]]],
       [[[431, 405, 244],
         [221, 454, 201],
         [241, 311, 464],
         [242, 346, 310]],
        [[254, 247, 466],
         [491, 218, 295],
         [200, 263, 411],
         [377, 310, 417]]],
       [[[376, 213, 352],
         [342, 210, 231],
         [258, 208, 420],
         [463, 304, 259]],
        [[294, 343, 226],
         [441, 464, 437],
         [238, 229, 375],
         [230, 376, 200]]],
       [[[336, 316, 466],
         [464, 464, 432],
         [418, 368, 335],
         [294, 254, 234]],
        [[370, 459, 282],
         [257, 330, 425],
         [268, 416, 202],
         [378, 499, 400]]],
       [[[257, 318, 481],
         [463, 285, 211],
         [290, 458, 490],
         [408, 488, 498]],
        [[235, 355, 254],
         [473, 205, 247],
         [252, 206, 334],
         [383, 332, 259]]]])
```

In [ ]:

1 5,2,4,3

In [77]:

1 arr.shape

Out[77]:

(5, 2, 4, 3)

In [79]:

1 arr

Out[79]:

```
array([[[[141, 157],
         [141, 568],
         [141, 568],
         [157, 157]],
        [[141, 568],
         [141, 157],
         [141, 141],
         [568, 568]],
        [[157, 141],
         [157, 157],
         [141, 568],
         [141, 568]]],
       [[[568, 568],
         [568, 568],
         [141, 157],
         [157, 141]],
In [80]:
   arr.[shape, 157],
         [141, 141],
Out[80]: [157, 568],
         [157, 141]],
(5, 3, 4, 2)
        [[568, 157],
In [81]: [568, 568],
         [157, 568],
   arr=a[r145.77,1att0t&h]()),
In [82][[141, 141],
         [568, 157],
   arr
         [568, 568],
Out[82]: [568, 568]],
array([1411415714141, 568, 141, 568, 157, 157, 141, 568, 141, 157, 141,
       1411456815568, 157, 141, 157, 157, 141, 568, 141, 568, 568, 568,
       5681456815741, 157, 157, 141, 157, 157, 141, 141, 157, 568, 157,
       1411456856857, 568, 568, 157, 568, 157, 568, 141, 141, 568, 157,
       568, 568, 568, 568, 141, 141, 141, 157, 141, 157, 141, 568, 141,
       1411415714141, 141, 157, 568, 157, 568, 157, 141, 568, 157, 157,
       1411514114141, 141, 141, 568, 568, 141, 568, 157, 568, 568, 157,
       5681415715768, 157, 568, 157, 568, 157, 568, 141, 141, 141,
       5685684115757],568, 141, 141, 568, 141, 157, 568, 157, 157, 141,
       141, 568, 157])
In [83][[[568, 157],
         [141, 568],
    arr.s[h1a5p7e, 157],
 1
         [141, 141]]
Out[83]:
        [[141, 141],
(120,)
         [141, 568],
         [568, 141],
         [568, 157]],
        [[568, 568],
         [157, 568],
         [157, 568],
```

[141, 141], [568, 157]]])

```
In [88]:

1 arr=np.arange(1,1001).reshape(2,50,10)

        [568, 157],
        [568, 141],
        [141, 141]],

        [[57, 568],
        [141, 141],
        [568, 141],
        [[57, 568],
        [141, 141],
        [568, 141]],

        [[157, 568],
        [157, 157],
        [157, 157],
```

In [89]:

1 arr

Out[89]:

```
3,
                                           5,
array([[[
              1,
                     2,
                                    4,
                                                   6,
                                                          7,
                                                                  8,
                                                                         9,
                                                                               10],
                                   14,
                                                                        19,
             11,
                    12,
                            13,
                                          15,
                                                  16,
                                                                18,
                                                                               20],
                                                         17,
                                          25,
             21,
                                                  26,
                                                         27,
                                                                        29,
                                                                               30],
                    22,
                            23,
                                   24,
                                                                28,
                                          35,
                                                         37,
                                                                               40],
             31,
                    32,
                            33,
                                   34,
                                                  36,
                                                                38,
                                                                        39,
                                          45,
                                                                               50],
             41,
                    42,
                            43,
                                   44,
                                                  46,
                                                         47,
                                                                48,
                                                                        49,
                                                                        59,
             51,
                    52,
                            53,
                                   54,
                                          55,
                                                  56,
                                                         57,
                                                                58,
                                                                               60],
             61,
                    62,
                            63,
                                   64,
                                          65,
                                                  66,
                                                         67,
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     arr <sup>375</sup>,
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Out[142]397,
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In [115]<sub>496</sub>,
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Out[115]<sup>§29</sup>,
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In [116]<sup>573</sup>,
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In [117]<sub>683</sub>,
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array([1738, 3734, 5740]) 741,
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In [118]<sup>760</sup>,
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Out[118]804,
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array([1_{82}^2, 3_{82}^4, 5_{82}^8])
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In [122]<sup>848</sup>,
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Out[122]892,
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array([1912;
               <sup>3</sup>915;
                      5916])
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In [121]936,
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     arr <sub>958</sub>,
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Out[121] 980,
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array([2,93, 4,993, 6,997])
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                                      995,
                                              996,
                                                                   999, 1000])
```

## In [123]:

```
1 np.random.randint(1,10,100)
```

#### Out[123]:

```
array([7, 4, 7, 9, 4, 6, 8, 4, 9, 2, 8, 8, 1, 9, 6, 2, 2, 1, 9, 6, 9, 7, 8, 9, 1, 6, 1, 5, 6, 8, 5, 4, 8, 7, 2, 1, 3, 6, 5, 5, 2, 8, 6, 1, 2, 1, 4, 5, 2, 3, 1, 5, 7, 8, 5, 5, 8, 2, 7, 6, 6, 1, 8, 7, 7, 2, 7, 1, 8, 4, 9, 1, 5, 4, 4, 1, 2, 9, 6, 6, 3, 4, 5, 3, 4, 6, 7, 3, 7, 6, 5, 8, 9, 2, 6, 4, 6, 1, 8, 4])
```

#### In [124]:

```
1 arr=np.array([1,2,3])
```

#### In [125]:

```
1 np.random.choice(arr,10)
```

#### Out[125]:

```
array([2, 1, 3, 1, 2, 1, 2, 3, 1, 1])
```

```
In [127]:
 1 np.linspace(1,2,10)
Out[127]:
array([1.
               , 1.11111111, 1.22222222, 1.33333333, 1.44444444,
      1.5555556, 1.66666667, 1.77777778, 1.88888889, 2.
In [128]:
 1 arr=np.array([77,82,69,1,7])
In [129]:
 1 arr
Out[129]:
array([77, 82, 69, 1, 7])
In [130]:
 1 np.argsort(arr)
Out[130]:
array([3, 4, 2, 0, 1], dtype=int64)
In [131]:
 1 np.sort(arr)
Out[131]:
array([ 1, 7, 69, 77, 82])
In [132]:
 1 arr=np.array([21,-47,50,-61])
In [133]:
 1 arr
Out[133]:
array([ 21, -47, 50, -61])
In [134]:
 1 np.argsort(arr)
Out[134]:
array([3, 1, 0, 2], dtype=int64)
```

```
In [136]:
 1 a=np.array([3,8,5,4,1])
 2 b=np.array([9,1,7,0,5])
In [137]:
 1 a.max()
Out[137]:
8
In [138]:
 1 a.min()
Out[138]:
1
In [139]:
 1 np.maximum(a,b)
Out[139]:
array([9, 8, 7, 4, 5])
In [140]:
 1 np.minimum(a,b)
Out[140]:
array([3, 1, 5, 0, 1])
In [141]:
 1 np.ndim(arr)
Out[141]:
1
In [173]:
 1 arr=np.arange(1,10).reshape(3,3)
In [174]:
 1 arr
Out[174]:
array([[1, 2, 3],
       [4, 5, 6],
       [7, 8, 9]])
```

```
In [175]:
 1 mat=np.matrix(arr)
In [176]:
 1 mat
Out[176]:
matrix([[1, 2, 3],
        [4, 5, 6],
        [7, 8, 9]])
In [181]:
 1 np.invert(arr)
Out[181]:
array([[-2, -3, -4],
      [-5, -6, -7],
       [ -8, -9, -10]], dtype=int32)
In [182]:
 1 np.linalg.inv(arr)
Out[182]:
array([[-4.50359963e+15, 9.00719925e+15, -4.50359963e+15],
       [ 9.00719925e+15, -1.80143985e+16, 9.00719925e+15],
       [-4.50359963e+15, 9.00719925e+15, -4.50359963e+15]])
In [183]:
 1 np.linalg.det(arr)
Out[183]:
6.66133814775094e-16
In [184]:
 1 np.linalg.eig(arr)
Out[184]:
(array([ 1.61168440e+01, -1.11684397e+00, -4.22209278e-16]),
array([[-0.23197069, -0.78583024, 0.40824829],
        [-0.52532209, -0.08675134, -0.81649658],
        [-0.8186735 , 0.61232756, 0.40824829]]))
In [185]:
 1 np.sum(a)
Out[185]:
21
```

# In [186]:

1 a.sum()

# Out[186]:

21

In [188]:

1 arr

Out[188]:

```
array([[[[235, 392, 461, 616, 463, 270, 398],
         [626, 572, 471, 839, 819, 274, 483],
In [189]: [929, 583, 981, 81, 483, 51, 507],
    arr. shape 869, 282, 426, 551, 755, 533],
         [458, 872, 812, 216, 751, 78, 86]],
Out[189]:
        [[585, 921, 334, 637, 479, 651, 981],
(2, 5, 5, [8)6, 528, 34, 40, 936, 15, 202],
         [960, 913, 346, 216, 889, 352, 722],
         [276, 911, 803, 297, 464, 951, 31],
In [ ]:
         [647, 271, 508, 615, 999, 792, 539]],
 1
        [[ 16, 900, 801, 654, 347, 502, 193],
         [735, 26, 292, 870, 94, 470, 620],
         [513, 121, 574, 764, 821, 870, 202],
         [461, 283, 720, 609, 225, 111, 479],
         [572, 760, 693, 163, 942, 426, 210]],
        [[442, 877, 446, 252, 996, 203, 814],
         [788, 698, 190, 216, 47, 151, 960],
```