

Multrows and columns, loc

November 19, 2016

```
In [1]: import pandas as pd
```

```
In [2]: ufo = pd.read_csv('http://bit.ly/uforeports')
```

```
In [3]: ufo.head()
```

```
Out[3]:
```

	City	Colors Reported	Shape Reported	State	Time
0	Ithaca	NaN	TRIANGLE	NY	6/1/1930 22:00
1	Willingboro	NaN	OTHER	NJ	6/30/1930 20:00
2	Holyoke	NaN	OVAL	CO	2/15/1931 14:00
3	Abilene	NaN	DISK	KS	6/1/1931 13:00
4	New York Worlds Fair	NaN	LIGHT	NY	4/18/1933 19:00

```
In [4]: ufo.head(3)
```

```
Out[4]:
```

	City	Colors Reported	Shape Reported	State	Time
0	Ithaca	NaN	TRIANGLE	NY	6/1/1930 22:00
1	Willingboro	NaN	OTHER	NJ	6/30/1930 20:00
2	Holyoke	NaN	OVAL	CO	2/15/1931 14:00

```
In [5]: ufo.loc[1, 'Colors Reported']
```

```
Out[5]: nan
```

```
In [6]: ufo.loc[0, :]
```

```
Out[6]: City                Ithaca
Colors Reported            NaN
Shape Reported            TRIANGLE
State                    NY
Time                6/1/1930 22:00
Name: 0, dtype: object
```

```
In [7]: type(ufo.loc[0, :])
```

```
Out[7]: pandas.core.series.Series
```

```
In [8]: ufo.loc[0:2, 'State'] # rows and columns => rows 0 through 2, 'State'
```

```
Out[8]: 0    NY
        1    NJ
        2    CO
        Name: State, dtype: object
```

```
In [9]: ufo.loc[0:2, :] # rows 0 through 2 and all columns
```

```
Out[9]:
```

	City	Colors	Reported Shape	Reported State	Time
0	Ithaca	NaN	TRIANGLE	NY	6/1/1930 22:00
1	Willingboro	NaN	OTHER	NJ	6/30/1930 20:00
2	Holyoke	NaN	OVAL	CO	2/15/1931 14:00

```
In [10]: ufo.loc[0:2] # if you leave off , will return all
```

```
Out[10]:
```

	City	Colors	Reported Shape	Reported State	Time
0	Ithaca	NaN	TRIANGLE	NY	6/1/1930 22:00
1	Willingboro	NaN	OTHER	NJ	6/30/1930 20:00
2	Holyoke	NaN	OVAL	CO	2/15/1931 14:00

```
In [11]: ufo.loc[:, 'City']
```

```
Out[11]: 0          Ithaca
        1    Willingboro
        2          Holyoke
        3          Abilene
        4    New York Worlds Fair
        5          Valley City
        6          Crater Lake
        7            Alma
        8          Eklutna
        9          Hubbard
       10          Fontana
       11          Waterloo
       12            Belton
       13          Keokuk
       14          Ludington
       15    Forest Home
       16    Los Angeles
       17          Hapeville
       18          Oneida
       19    Bering Sea
       20          Nebraska
       21            NaN
       22            NaN
       23    Owensboro
       24    Wilderness
       25          San Diego
       26    Wilderness
       27          Clovis
```

```

28             Los Alamos
29             Ft. Duschene
...
18211          Holyoke
18212          Carson
18213          Pasadena
18214          Austin
18215          El Campo
18216          Garden Grove
18217          Berthoud Pass
18218          Sisterdale
18219          Garden Grove
18220          Shasta Lake
18221          Franklin
18222          Albrightsville
18223          Greenville
18224          Eufaula
18225          Simi Valley
18226          San Francisco
18227          San Francisco
18228          Kingsville
18229          Chicago
18230          Pismo Beach
18231          Pismo Beach
18232          Lodi
18233          Anchorage
18234          Capitola
18235          Fountain Hills
18236          Grant Park
18237          Spirit Lake
18238          Eagle River
18239          Eagle River
18240          Ybor
Name: City, dtype: object

```

```
In [12]: ufo.loc[:, ['City', 'Time']]
```

```

Out[12]:
      City      Time
0      Ithaca  6/1/1930 22:00
1  Willingboro  6/30/1930 20:00
2      Holyoke  2/15/1931 14:00
3      Abilene  6/1/1931 13:00
4  New York Worlds Fair  4/18/1933 19:00
5      Valley City  9/15/1934 15:30
6      Crater Lake  6/15/1935 0:00
7        Alma  7/15/1936 0:00
8      Eklutna 10/15/1936 17:00
9      Hubbard  6/15/1937 0:00

```

10	Fontana	8/15/1937	21:00
11	Waterloo	6/1/1939	20:00
12	Belton	6/30/1939	20:00
13	Keokuk	7/7/1939	2:00
14	Ludington	6/1/1941	13:00
15	Forest Home	7/2/1941	11:30
16	Los Angeles	2/25/1942	0:00
17	Hapeville	6/1/1942	22:30
18	Oneida	7/15/1942	1:00
19	Bering Sea	4/30/1943	23:00
20	Nebraska	6/1/1943	15:00
21	NaN	8/15/1943	0:00
22	NaN	8/15/1943	0:00
23	Owensboro	10/15/1943	11:00
24	Wilderness	1/1/1944	10:00
25	San Diego	1/1/1944	12:00
26	Wilderness	1/1/1944	12:00
27	Clovis	4/2/1944	11:00
28	Los Alamos	6/1/1944	12:00
29	Ft. Duschene	6/30/1944	10:00
...
18211	Holyoke	12/28/2000	18:00
18212	Carson	12/28/2000	18:20
18213	Pasadena	12/28/2000	19:10
18214	Austin	12/29/2000	0:00
18215	El Campo	12/29/2000	9:00
18216	Garden Grove	12/29/2000	16:10
18217	Berthoud Pass	12/29/2000	19:30
18218	Sisterdale	12/29/2000	20:00
18219	Garden Grove	12/29/2000	20:30
18220	Shasta Lake	12/29/2000	20:30
18221	Franklin	12/29/2000	20:50
18222	Albrightsville	12/29/2000	21:00
18223	Greenville	12/29/2000	22:00
18224	Eufaula	12/29/2000	23:30
18225	Simi Valley	12/30/2000	10:00
18226	San Francisco	12/30/2000	22:00
18227	San Francisco	12/30/2000	22:00
18228	Kingsville	12/31/2000	4:00
18229	Chicago	12/31/2000	11:45
18230	Pismo Beach	12/31/2000	20:00
18231	Pismo Beach	12/31/2000	20:00
18232	Lodi	12/31/2000	20:30
18233	Anchorage	12/31/2000	21:00
18234	Capitola	12/31/2000	22:00
18235	Fountain Hills	12/31/2000	23:00
18236	Grant Park	12/31/2000	23:00
18237	Spirit Lake	12/31/2000	23:00

```

18238          Eagle River 12/31/2000 23:45
18239          Eagle River 12/31/2000 23:45
18240          Ybor      12/31/2000 23:59

```

```
[18241 rows x 2 columns]
```

```
In [13]: ufo.loc[:, 'City' : 'State']
```

```

Out[13]:
          City Colors Reported Shape Reported State
0          Ithaca          NaN    TRIANGLE    NY
1    Willingboro          NaN    OTHER      NJ
2        Holyoke          NaN    OVAL      CO
3        Abilene          NaN    DISK      KS
4  New York Worlds Fair          NaN    LIGHT    NY
5    Valley City          NaN    DISK    ND
6    Crater Lake          NaN    CIRCLE    CA
7          Alma          NaN    DISK    MI
8        Eklutna          NaN    CIGAR    AK
9        Hubbard          NaN    CYLINDER    OR
10        Fontana          NaN    LIGHT    CA
11    Waterloo          NaN    FIREBALL    AL
12        Belton          RED    SPHERE    SC
13        Keokuk          NaN    OVAL    IA
14    Ludington          NaN    DISK    MI
15    Forest Home          NaN    CIRCLE    CA
16    Los Angeles          NaN          NaN    CA
17    Hapeville          NaN          NaN    GA
18        Oneida          NaN    RECTANGLE    TN
19    Bering Sea          RED    OTHER    AK
20    Nebraska          NaN    DISK    NE
21          NaN          NaN          NaN    LA
22          NaN          NaN    LIGHT    LA
23    Owensboro          NaN    RECTANGLE    KY
24    Wilderness          NaN    DISK    WV
25    San Diego          NaN    CIGAR    CA
26    Wilderness          NaN    DISK    WV
27        Clovis          NaN    DISK    NM
28    Los Alamos          NaN    DISK    NM
29    Ft. Duschene          NaN    DISK    UT
...          ...          ...          ...
18211        Holyoke          NaN    DIAMOND    MA
18212        Carson          NaN    DISK    CA
18213    Pasadena          GREEN    FIREBALL    CA
18214        Austin          NaN    FORMATION    TX
18215    El Campo          NaN    OTHER    TX
18216    Garden Grove          ORANGE    LIGHT    CA
18217    Berthoud Pass          NaN    TRIANGLE    CO
18218    Sisterdale          NaN    DIAMOND    TX

```

18219	Garden Grove	NaN	CHEVRON	CA
18220	Shasta Lake	BLUE	DISK	CA
18221	Franklin	NaN	DISK	NH
18222	Albrightsville	NaN	OTHER	PA
18223	Greenville	NaN	NaN	SC
18224	Eufaula	NaN	DISK	OK
18225	Simi Valley	NaN	FORMATION	CA
18226	San Francisco	NaN	FORMATION	CA
18227	San Francisco	NaN	TRIANGLE	CA
18228	Kingsville	NaN	LIGHT	TX
18229	Chicago	NaN	DISK	IL
18230	Pismo Beach	NaN	OVAL	CA
18231	Pismo Beach	NaN	OVAL	CA
18232	Lodi	NaN	NaN	WI
18233	Anchorage	RED	VARIOUS	AK
18234	Capitola	NaN	TRIANGLE	CA
18235	Fountain Hills	NaN	NaN	AZ
18236	Grant Park	NaN	TRIANGLE	IL
18237	Spirit Lake	NaN	DISK	IA
18238	Eagle River	NaN	NaN	WI
18239	Eagle River	RED	LIGHT	WI
18240	Ybor	NaN	OVAL	FL

[18241 rows x 4 columns]

```
In [14]: ufo.head(3).drop('Time', axis=1)
```

```
Out[14]:
```

	City	Colors	Reported	Shape	Reported	State
0	Ithaca		NaN	TRIANGLE		NY
1	Willingboro		NaN	OTHER		NJ
2	Holyoke		NaN	OVAL		CO

```
In [20]: ufo.loc[ufo.City == 'Oakland'] # all values for City Oakland
```

```
Out[20]:
```

	City	Colors	Reported	Shape	Reported	State	Time
1694	Oakland		NaN	CIGAR	CA	7/21/1968	14:00
2144	Oakland		NaN	DISK	CA	8/19/1971	0:00
4686	Oakland		NaN	LIGHT	MD	6/1/1982	0:00
7293	Oakland		NaN	LIGHT	CA	3/28/1994	17:00
8488	Oakland		NaN	NaN	CA	8/10/1995	21:45
8768	Oakland		NaN	NaN	CA	10/10/1995	22:40
10816	Oakland		NaN	LIGHT	OR	10/1/1997	21:30
10948	Oakland		NaN	DISK	CA	11/14/1997	19:55
11045	Oakland		NaN	TRIANGLE	CA	12/10/1997	1:30
12322	Oakland		NaN	FIREBALL	CA	10/9/1998	19:40
12941	Oakland		NaN	CYLINDER	CA	1/23/1999	21:30
16803	Oakland		NaN	TRIANGLE	MD	7/4/2000	23:00
17322	Oakland		NaN	CYLINDER	CA	9/1/2000	21:35

```
In [27]: ufo.loc[(ufo.City == 'San Francisco') & (ufo.Time == '6/15/1956 12:15')]
```

```
Out[27]:
```

	City	Colors	Reported Shape	Reported State	Time
360	San Francisco		NaN	OTHER CA	6/15/1956 12:15

```
In [28]: ufo.iloc[:, [0, 3]] # iloc -> integer positions
```

```
Out[28]:
```

	City	State
0	Ithaca	NY
1	Willingboro	NJ
2	Holyoke	CO
3	Abilene	KS
4	New York Worlds Fair	NY
5	Valley City	ND
6	Crater Lake	CA
7	Alma	MI
8	Eklutna	AK
9	Hubbard	OR
10	Fontana	CA
11	Waterloo	AL
12	Belton	SC
13	Keokuk	IA
14	Ludington	MI
15	Forest Home	CA
16	Los Angeles	CA
17	Hapeville	GA
18	Oneida	TN
19	Bering Sea	AK
20	Nebraska	NE
21	NaN	LA
22	NaN	LA
23	Owensboro	KY
24	Wilderness	WV
25	San Diego	CA
26	Wilderness	WV
27	Clovis	NM
28	Los Alamos	NM
29	Ft. Duschene	UT
...
18211	Holyoke	MA
18212	Carson	CA
18213	Pasadena	CA
18214	Austin	TX
18215	El Campo	TX
18216	Garden Grove	CA
18217	Berthoud Pass	CO
18218	Sisterdale	TX
18219	Garden Grove	CA

18220	Shasta Lake	CA
18221	Franklin	NH
18222	Albrightsville	PA
18223	Greenville	SC
18224	Eufaula	OK
18225	Simi Valley	CA
18226	San Francisco	CA
18227	San Francisco	CA
18228	Kingsville	TX
18229	Chicago	IL
18230	Pismo Beach	CA
18231	Pismo Beach	CA
18232	Lodi	WI
18233	Anchorage	AK
18234	Capitola	CA
18235	Fountain Hills	AZ
18236	Grant Park	IL
18237	Spirit Lake	IA
18238	Eagle River	WI
18239	Eagle River	WI
18240	Ybor	FL

[18241 rows x 2 columns]

In [29]: `ufo.iloc[:, 0:4]` # columns in positions 0, 1, 2, 3 (exclusive second number)

Out[29]:

	City	Colors	Reported	Shape	Reported	State
0	Ithaca		NaN		TRIANGLE	NY
1	Willingboro		NaN		OTHER	NJ
2	Holyoke		NaN		OVAl	CO
3	Abilene		NaN		DISK	KS
4	New York Worlds Fair		NaN		LIGHT	NY
5	Valley City		NaN		DISK	ND
6	Crater Lake		NaN		CIRCLE	CA
7	Alma		NaN		DISK	MI
8	Eklutna		NaN		CIGAR	AK
9	Hubbard		NaN		CYLINDER	OR
10	Fontana		NaN		LIGHT	CA
11	Waterloo		NaN		FIREBALL	AL
12	Belton		RED		SPHERE	SC
13	Keokuk		NaN		OVAl	IA
14	Ludington		NaN		DISK	MI
15	Forest Home		NaN		CIRCLE	CA
16	Los Angeles		NaN		NaN	CA
17	Hapeville		NaN		NaN	GA
18	Oneida		NaN		RECTANGLE	TN
19	Bering Sea		RED		OTHER	AK
20	Nebraska		NaN		DISK	NE

21		NaN	NaN	NaN	LA
22		NaN	NaN	LIGHT	LA
23	Owensboro		NaN	RECTANGLE	KY
24	Wilderness		NaN	DISK	WV
25	San Diego		NaN	CIGAR	CA
26	Wilderness		NaN	DISK	WV
27	Clovis		NaN	DISK	NM
28	Los Alamos		NaN	DISK	NM
29	Ft. Duschene		NaN	DISK	UT
...
18211	Holyoke		NaN	DIAMOND	MA
18212	Carson		NaN	DISK	CA
18213	Pasadena	GREEN		FIREBALL	CA
18214	Austin		NaN	FORMATION	TX
18215	El Campo		NaN	OTHER	TX
18216	Garden Grove	ORANGE		LIGHT	CA
18217	Berthoud Pass		NaN	TRIANGLE	CO
18218	Sisterdale		NaN	DIAMOND	TX
18219	Garden Grove		NaN	CHEVRON	CA
18220	Shasta Lake	BLUE		DISK	CA
18221	Franklin		NaN	DISK	NH
18222	Albrightsville		NaN	OTHER	PA
18223	Greenville		NaN	NaN	SC
18224	Eufaula		NaN	DISK	OK
18225	Simi Valley		NaN	FORMATION	CA
18226	San Francisco		NaN	FORMATION	CA
18227	San Francisco		NaN	TRIANGLE	CA
18228	Kingsville		NaN	LIGHT	TX
18229	Chicago		NaN	DISK	IL
18230	Pismo Beach		NaN	OVAL	CA
18231	Pismo Beach		NaN	OVAL	CA
18232	Lodi		NaN	NaN	WI
18233	Anchorage	RED		VARIOUS	AK
18234	Capitola		NaN	TRIANGLE	CA
18235	Fountain Hills		NaN	NaN	AZ
18236	Grant Park		NaN	TRIANGLE	IL
18237	Spirit Lake		NaN	DISK	IA
18238	Eagle River		NaN	NaN	WI
18239	Eagle River	RED		LIGHT	WI
18240	Ybor		NaN	OVAL	FL

[18241 rows x 4 columns]

In [30]: `ufo.iloc[0:3, :] # shows rows 0, 1, 2 => iloc`

Out[30]:

	City	Colors Reported	Shape Reported	State	Time
0	Ithaca	NaN	TRIANGLE	NY	6/1/1930 22:00
1	Willingboro	NaN	OTHER	NJ	6/30/1930 20:00
2	Holyoke	NaN	OVAL	CO	2/15/1931 14:00

```
In [31]: ufo[0:2] # just gives you first two rows => rows 1 and 2
```

```
Out[31]:
```

	City	Colors	Reported	Shape	Reported	State	Time
0	Ithaca		NaN	TRIANGLE	NY	6/1/1930	22:00
1	Willingboro		NaN	OTHER	NJ	6/30/1930	20:00

```
In [32]: ufo.loc[0:2, :] # same as but cleaner code
```

```
Out[32]:
```

	City	Colors	Reported	Shape	Reported	State	Time
0	Ithaca		NaN	TRIANGLE	NY	6/1/1930	22:00
1	Willingboro		NaN	OTHER	NJ	6/30/1930	20:00
2	Holyoke		NaN	OVAL	CO	2/15/1931	14:00

```
In [34]: drinks = pd.read_csv('http://bit.ly/drinksbycountry', index_col='country')
# set index while reading in
```

```
In [35]: drinks.head()
```

```
Out[35]:
```

	beer_servings	spirit_servings	wine_servings	\
country				
Afghanistan	0	0	0	
Albania	89	132	54	
Algeria	25	0	14	
Andorra	245	138	312	
Angola	217	57	45	

	total_litres_of_pure_alcohol	continent
country		
Afghanistan	0.0	Asia
Albania	4.9	Europe
Algeria	0.7	Africa
Andorra	12.4	Europe
Angola	5.9	Africa

```
In [36]: drinks.ix['Albania', 0]
# label 'Albania', position 0
```

```
Out[36]: 89
```

```
In [37]: drinks.ix[1, 'beer_servings'] # ix either position or label
```

```
Out[37]: 89
```

```
In [38]: drinks.ix['Albania' : 'Andorra', 0:2]
# Albania through Andorra, positions 1 and 2 in columns
```

```
Out[38]:
```

	beer_servings	spirit_servings
country		
Albania	89	132
Algeria	25	0
Andorra	245	138

```
In [39]: ufo.ix[0:2, 0:2] # treats integer index as label => inclusive on both sides
        # treats columns Strings as exclusive of 2nd column
```

```
Out[39]:
```

	City	Colors	Reported
0	Ithaca		NaN
1	Willingboro		NaN
2	Holyoke		NaN

```
In [ ]:
```