Creating DataFrames

```
import pandas as pd
```

```
df = pd.DataFrame({"a":[4,5,6],"b":[7,8,9],"c":[10,11,12]},index = [1,2,3])
df
```

```
   a  b   c
1  4  7  10
2  5  8  11
3  6  9  12
```

```
df = pd.DataFrame([[4,7,10],[5,8,11],[6,9,12]],index = [1,2,3],columns = ['a','b','c'])
df
```

```
   a  b   c
1  4  7  10
2  5  8  11
3  6  9  12
```

```
df = pd.DataFrame({"a":[4,5,6],"b":[7,8,9],"c":[10,11,12]}, index = pd.MultiIndex.from_
df
```

```
       a  b   c
n  v
d  1   4  7  10
   2   5  8  11
e  2   6  9  12
```

Reshaping Data

```
pd.melt(df)
```

	variable	value
0	a	4
1	a	5
2	a	6
3	b	7
4	b	8
5	b	9
6	c	10

```
df2 = (pd.melt(df).rename(columns = {'variable':'var','value':'val'}).query('val >= 20
df2.pivot(columns='var',values = 'val')
```

var

```
pd.concat([df,df2])
```

		a	b	c	var	val
n	**v**					
d	**1**	4.0	7.0	10.0	NaN	NaN
	2	5.0	8.0	11.0	NaN	NaN
e	**2**	6.0	9.0	12.0	NaN	NaN

```
pd.concat([df,df2],axis = 1)
```

		a	b	c	var	val
d	**1**	4	7	10	NaN	NaN
	2	5	8	11	NaN	NaN
e	**2**	6	9	12	NaN	NaN

```
df.drop(columns='b')
```

		a	c
n	**v**		
d	**1**	4	10
	2	5	11
e	**2**	6	12

```
df.rename(columns={'a':'colA','b':'colB','c':'colC'})
```

		colA	colB	colC
n	**v**			
d	**1**	4	7	10
	2	5	8	11
e	**2**	6	9	12

```
df.sort_values('a')
```

		a	b	c
n	**v**			
d	**1**	4	7	10
	2	5	8	11
e	**2**	6	9	12

```
df.sort_values('a', ascending = False)
```

		a	b	c
n	**v**			
e	**2**	6	9	12
d	**2**	5	8	11
	1	4	7	10

```
df.sort_index()
```

		a	b	c
n	**v**			
d	**1**	4	7	10
	2	5	8	11
e	**2**	6	9	12

```
df.reset_index()
```

	n	v	a	b	c

Method Chaining

```
bla = (pd.melt(df).rename(columns = {'variable':'var','value':'val'}).query('val >= 20
bla
```

var	val

SUBSET OBSERVATIONS-ROWS

```
df=pd.DataFrame({"a":[4,5,6],"b":[7,8,9],"c":[10,11,12]},index = [1,2,3])
df
```

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

```
df[df.a > 4]
```

	a	b	c
2	5	8	11
3	6	9	12

```
df.drop_duplicates()
```

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

```
df.sample(frac = 0.5)
```

	a	b	c

```
df.nlargest(2,'c')
```

	a	b	c
3	6	9	12
2	5	8	11

```
df.nsmallest(2,'c')
```

	a	b	c
1	4	7	10
2	5	8	11

```
df.head(2)
```

	a	b	c
1	4	7	10
2	5	8	11

```
df.tail(2)
```

	a	b	c
2	5	8	11
3	6	9	12

SUBSET VARIABLES - COLUMNS

```
df[['b','c']]
```

	b	c
1	7	10
2	8	11
3	9	12

```
df['c']
```

```
1    10
2    11
```

```
3    12
Name: c, dtype: int64
```

```
df.filter(regex='regex')
```

1
2
3

USING QUERY

```
df.query('a>4')
```

	a	b	c
2	5	8	11
3	6	9	12

```
df.query('a>4' and 'b>6')
```

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

SUBSETS - ROWS AND COLUMNS

```
df.loc[:]
```

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

```
df.iloc[:]
```

	a	b	c
1	4	7	10
2	5	8	11

```
df.loc[:,'x2':'x4']
```

1
2
3

```
df.loc[df['a'] > 1 , ['a','c']]
```

	a	c
1	4	10
2	5	11
3	6	12

```
df.iat[1,2]
```

```
11
```

```
df.at[2,'b']
```

```
8
```

SUMMARIZING DATA

```
df['b'].value_counts()
```

```
7    1
8    1
9    1
Name: b, dtype: int64
```

```
len(df)
```

```
3
```

```
df.shape
```

```
(3, 3)
```

```
df['a'].nunique()
```

```
3
```

```
df.describe()
```

	a	b	c
count	3.0	3.0	3.0
mean	5.0	8.0	11.0
std	1.0	1.0	1.0
min	4.0	7.0	10.0
25%	4.5	7.5	10.5
50%	5.0	8.0	11.0
75%	5.5	8.5	11.5
max	6.0	9.0	12.0

```
df.sum()
```

```
a    15
b    24
c    33
dtype: int64
```

```
df.count()
```

```
a    3
b    3
c    3
dtype: int64
```

```
df.median()
```

```
a     5.0
b     8.0
c    11.0
dtype: float64
```

```
df.quantile([0.25,0.75])
```

	a	b	c
0.25	4.5	7.5	10.5
0.75	5.5	8.5	11.5

```
df.apply(sum)
```

```
a    15
b    24
c    33
dtype: int64
```

```
df.min()
```

```
a     4
b     7
c    10
dtype: int64
```

```
df.max()
```

```
a     6
b     9
c    12
dtype: int64
```

```
df.mean()
```

```
a     5.0
b     8.0
c    11.0
dtype: float64
```

```
df.var()
```

```
a    1.0
b    1.0
c    1.0
dtype: float64
```

```
df.std()
```

```
a    1.0
b    1.0
c    1.0
dtype: float64
```

GROUP DATA

```
df.groupby(by='a')
```

```
<pandas.core.groupby.generic.DataFrameGroupBy object at 0x7fb0ed6ad690>
```

```
df.shift(1)
```

	a	b	c	Volume
1	NaN	NaN	NaN	NaN
2	4.0	7.0	10.0	280.0
3	5.0	8.0	11.0	440.0

```
df.rank(method = 'dense')
```

	a	b	c	Volume
1	1.0	1.0	1.0	1.0
2	2.0	2.0	2.0	2.0
3	3.0	3.0	3.0	3.0

```
df.rank(method = 'min')
```

	a	b	c	Volume
1	1.0	1.0	1.0	1.0
2	2.0	2.0	2.0	2.0
3	3.0	3.0	3.0	3.0

```
df.rank(pct=True)
```

	a	b	c	Volume
1	0.333333	0.333333	0.333333	0.333333
2	0.666667	0.666667	0.666667	0.666667
3	1.000000	1.000000	1.000000	1.000000

```
df.rank(method ='first')
```

	a	b	c	Volume
1	1.0	1.0	1.0	1.0
2	2.0	2.0	2.0	2.0
3	3.0	3.0	3.0	3.0

```
df.shift(-1)
```

	a	b	c	Volume

```
df.cumsum()
```

	a	b	c	Volume
1	4	7	10	280
2	9	15	21	720
3	15	24	33	1368

```
df.cummax()
```

	a	b	c	Volume
1	4	7	10	280
2	5	8	11	440
3	6	9	12	648

```
df.cummin()
```

	a	b	c	Volume
1	4	7	10	280
2	4	7	10	280
3	4	7	10	280

```
df.cumprod()
```

	a	b	c	Volume
1	4	7	10	280
2	20	56	110	123200
3	120	504	1320	79833600

HANDLING MISSING DATA

```
df.dropna()
```

	a	b	c

```
df.fillna(2)
```

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

MAKE NEW COLUMNS

```
df.assign(Area=lambda df:df.b*df.c)
```

	a	b	c	Area
1	4	7	10	70
2	5	8	11	88
3	6	9	12	108

```
df['Volume'] = df.a*df.b*df.c
df
```

	a	b	c	Volume
1	4	7	10	280
2	5	8	11	440
3	6	9	12	648

```
pd.qcut(df.a , 2 , labels = False)
```

```
1    0
2    0
3    1
Name: a, dtype: int64
```

```
df.max(axis=1)
```

```
1    280
2    440
3    648
dtype: int64
```

```
df.min(axis=1)
```

```
1    4
2    5
3    6
dtype: int64
```

```
df.clip(lower=-10,upper=10)
```

	a	b	c	Volume
1	4	7	10	10
2	5	8	10	10
3	6	9	10	10

```
df.abs()
```

	a	b	c	Volume
1	4	7	10	280
2	5	8	11	440
3	6	9	12	648

COMBINE DATA SETS

```
adf = pd.DataFrame({'a' : [1,2,3],'b' : [4,5,6],'c' : [7,8,9]})
adf
```

	a	b	c
0	1	4	7
1	2	5	8
2	3	6	9

```
bdf = pd.DataFrame({'a' : [10,11,12], 'b' : [13,14,15], 'c' : [16,17,18]})
bdf
```

	a	b	c
0	10	13	16
1	11	14	17
2	12	15	18

```
pd.merge(adf,bdf, how='left',on='a')
```

	a	b_x	c_x	b_y	c_y
0	1	4	7	NaN	NaN
1	2	5	8	NaN	NaN
2	3	6	9	NaN	NaN

```
pd.merge(adf,bdf,how='right', on = 'a')
```

	a	b_x	c_x	b_y	c_y
0	10	NaN	NaN	13	16
1	11	NaN	NaN	14	17
2	12	NaN	NaN	15	18

```
pd.merge(adf,bdf,how='inner',on = 'a')
```

a	b_x	c_x	b_y	c_y

```
pd.merge(adf,bdf,how='outer',on='a')
```

	a	b_x	c_x	b_y	c_y
0	1	4.0	7.0	NaN	NaN
1	2	5.0	8.0	NaN	NaN
2	3	6.0	9.0	NaN	NaN
3	10	NaN	NaN	13.0	16.0
4	11	NaN	NaN	14.0	17.0
5	12	NaN	NaN	15.0	18.0

```
adf[adf.a.isin(bdf.a)]
```

a	b	c

```
adf[~adf.a.isin(bdf.a)]
```

	a	b	c
0	1	4	7
1	2	5	8
2	3	6	9

```
ddf = pd.DataFrame({'a' : [10,11,12], 'b' : [13,14,15], 'c' : [16,17,18]})
ddf
```

	a	b	c
0	10	13	16
1	11	14	17
2	12	15	18

```
cdf = pd.DataFrame({'b' : [13,14,15], 'c' : [16,17,18], 'd' : [19,20,21]})
cdf
```

	b	c	d
0	13	16	19
1	14	17	20
2	15	18	21

```
pd.merge(cdf,ddf)
```

	b	c	d	a
0	13	16	19	10
1	14	17	20	11
2	15	18	21	12

```
pd.merge(cdf,ddf,how='outer')
```

	b	c	d	a
0	13	16	19	10
1	14	17	20	11
2	15	18	21	12

```
pd.merge(cdf,ddf,how='outer',indicator = True)
```

	b	c	d	a	_merge
0	13	16	19	10	both
1	14	17	20	11	both
2	15	18	21	12	both

Windows

```
df.expanding()
```

```
Expanding [min_periods=1,center=False,axis=0,method=single]
```

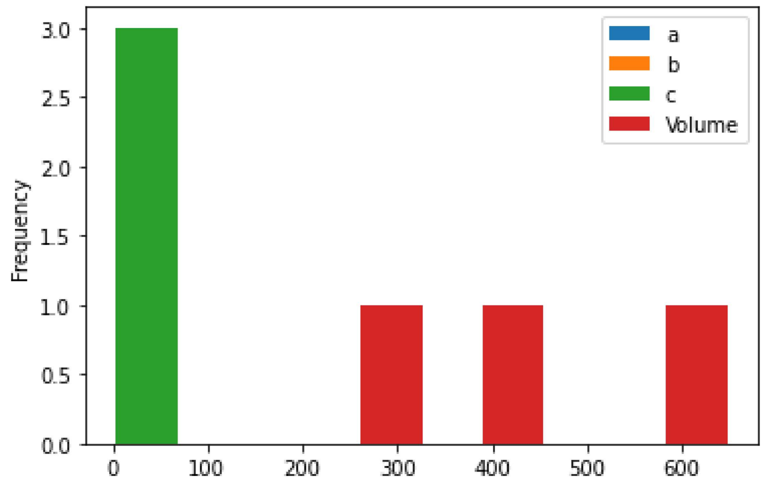
```
df.rolling(2)
```

```
Rolling [window=2,center=False,axis=0,method=single]
```

Plotting

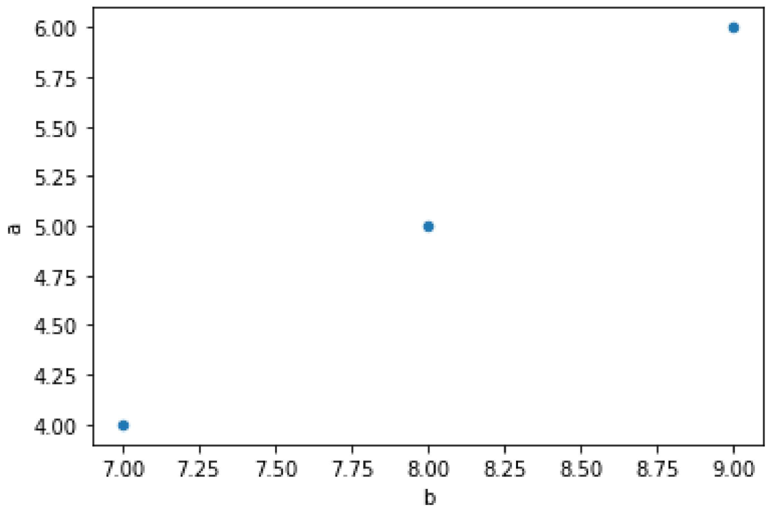
```
df.plot.hist()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fb0ed643190>
```



```
df.plot.scatter(x='b',y='a')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fb0ec8381d0>
```



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