```
import pandas as pd

df = pd.read_csv('nyc_temperatures.csv')
df.head()
```

	date	datatype	station	attributes	value
0	2018-10-01T00:00:00	TAVG	GHCND:USW00014732	H,,S,	21.2
1	2018-10-01T00:00:00	TMAX	GHCND:USW00014732	,,W,2400	25.6
2	2018-10-01T00:00:00	TMIN	GHCND:USW00014732	,,W,2400	18.3
3	2018-10-02T00:00:00	TAVG	GHCND:USW00014732	H,,S,	22.7
4	2018-10-02T00:00:00	TMAX	GHCND:USW00014732	,,W,2400	26.1

Next steps: View recommended plots

Renaming columns

```
df.columns
```

```
Index(['date', 'datatype', 'station', 'attributes', 'value'], dtype='object')
```

```
df.rename(
    columns = {
        'value' : 'temp_C',
        'attributes' : 'flags'
    }, inplace = True
)
```

```
df.columns
```

```
Index(['date', 'datatype', 'station', 'flags', 'temp_C'], dtype='object')
```

```
df.rename(str.upper, axis = 'columns').columns
```

```
Index(['DATE', 'DATATYPE', 'STATION', 'FLAGS', 'TEMP_C'], dtype='object')
```

Type Conversion

```
df.dtypes
```

```
date         object
datatype     object
station      object
flags        object
temp_C      float64
dtype: object
```

```
df.loc[:,'date'] = pd.to_datetime(df.date)
df.dtypes
```

```
<ipython-input-8-80606e5f8dec>:1: DeprecationWarning: In a future version, `df.iloc[:, i] = newvals` will attempt to set the values inplace instead of always setting a new array. To retain the old behavior, use either `df[df.columns[i]] = newvals` or, if columns are non-un
  df.loc[:,'date'] = pd.to_datetime(df.date)
date        datetime64[ns]
datatype            object
station             object
flags               object
temp_C             float64
dtype: object
```

```
df.date.describe()
```

```
<ipython-input-9-f7d3fa946723>:1: FutureWarning: Treating datetime data as categorical rather than numeric in `.describe` is deprecated and will be removed in a future version of pandas. Specify `datetime_is_numeric=True` to silence this warning and adopt the future behavic
  df.date.describe()
count                      93
unique                     31
top       2018-10-01 00:00:00
freq                        3
first     2018-10-01 00:00:00
last      2018-10-31 00:00:00
Name: date, dtype: object
```

```
pd.date_range(start='2018-10-25', periods=2, freq='D').tz_localize('EST')
# start indicates the date started
# periods would return two dates
# freq D means daily frequency
# tz_localize EST returns an EASTERN STANDARD TIME
```

```
DatetimeIndex(['2018-10-25 00:00:00-05:00', '2018-10-26 00:00:00-05:00'], dtype='datetime64[ns, EST]', freq=None)
```

```
eastern = pd.read_csv(
    'nyc_temperatures.csv', index_col='date', parse_dates=True
).tz_localize('EST')
eastern.head()
```

date	datatype	station	attributes	value
2018-10-01 00:00:00-05:00	TAVG	GHCND:USW00014732	H,,S,	21.2
2018-10-01 00:00:00-05:00	TMAX	GHCND:USW00014732	,,W,2400	25.6
2018-10-01 00:00:00-05:00	TMIN	GHCND:USW00014732	,,W,2400	18.3
2018-10-02 00:00:00-05:00	TAVG	GHCND:USW00014732	H,,S,	22.7
2018-10-02 00:00:00-05:00	TMAX	GHCND:USW00014732	,,W,2400	26.1

Next steps: View recommended plots

```
eastern.tz_convert('UTC').head()
```

date	datatype	station	attributes	value
2018-10-01 05:00:00+00:00	TAVG	GHCND:USW00014732	H,,S,	21.2
2018-10-01 05:00:00+00:00	TMAX	GHCND:USW00014732	,,W,2400	25.6
2018-10-01 05:00:00+00:00	TMIN	GHCND:USW00014732	,,W,2400	18.3
2018-10-02 05:00:00+00:00	TAVG	GHCND:USW00014732	H,,S,	22.7
2018-10-02 05:00:00+00:00	TMAX	GHCND:USW00014732	,,W,2400	26.1

```
eastern.to_period('M').index
```

```
<ipython-input-13-34a82283fe40>:1: UserWarning: Converting to PeriodArray/Index representation will drop timezone information.
  eastern.to_period('M').index
PeriodIndex(['2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10', '2018-10', '2018-10', '2018-10',
             '2018-10', '2018-10', '2018-10'],
            dtype='period[M]', name='date')
```

```
eastern.to_period('M').to_timestamp().index
```

```
<ipython-input-14-22abc5f95bfc>:1: UserWarning: Converting to PeriodArray/Index representation will drop timezone information.
  eastern.to_period('M').to_timestamp().index
DatetimeIndex(['2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
```

```
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01', '2018-10-01', '2018-10-01', '2018-10-01',
               '2018-10-01'],
              dtype='datetime64[ns]', name='date', freq=None)
```

```
df = pd.read_csv('nyc_temperatures.csv').rename(
    columns={
        'value' : 'temp_C',
        'attributes' : 'flags'
    }
)

new_df = df.assign(
    date = pd.to_datetime(df.date),
    temp_F=(df.temp_C * 9/5) + 32
)
new_df.dtypes
```

```
date        datetime64[ns]
datatype            object
station             object
flags               object
temp_C             float64
temp_F             float64
dtype: object
```

```
new_df.head()
```

	date	datatype	station	flags	temp_C	temp_F
0	2018-10-01	TAVG	GHCND:USW00014732	H,,S,	21.2	70.16
1	2018-10-01	TMAX	GHCND:USW00014732	,,W,2400	25.6	78.08
2	2018-10-01	TMIN	GHCND:USW00014732	,,W,2400	18.3	64.94
3	2018-10-02	TAVG	GHCND:USW00014732	H,,S,	22.7	72.86
4	2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	78.98

Next steps: View recommended plots

```
df = df.assign(
    date=pd.to_datetime(df.date),
    temp_C_whole=df.temp_C.astype('int'),
    temp_F=(df.temp_C * 9/5) + 32,
    temp_F_whole = lambda x: x.temp_F.astype('int')
)
df.head()
```

	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
0	2018-10-01	TAVG	GHCND:USW00014732	H,,S,	21.2	21	70.16	70
1	2018-10-01	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
2	2018-10-01	TMIN	GHCND:USW00014732	,,W,2400	18.3	18	64.94	64
3	2018-10-02	TAVG	GHCND:USW00014732	H,,S,	22.7	22	72.86	72
4	2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78

Next steps: View recommended plots

```
df_with_categories = df.assign(
    station = df.station.astype('category'),
    datatype = df.datatype.astype('category')
)
df_with_categories.dtypes
```

```
date            datetime64[ns]
datatype              category
station               category
flags                   object
temp_C                 float64
temp_C_whole             int64
temp_F                 float64
temp_F_whole             int64
dtype: object
```

```
pd.Categorical(
    ['med', 'med', 'low', 'high'],
    categories=['low', 'med', 'high'],
    ordered=True
)
```

```
['med', 'med', 'low', 'high']
Categories (3, object): ['low' < 'med' < 'high']
```

```
df.sort_values(by='temp_C', ascending=False).head(10)
```

	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
19	2018-10-07	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
28	2018-10-10	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
31	2018-10-11	TMAX	GHCND:USW00014732	,,W,2400	26.7	26	80.06	80
4	2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78
10	2018-10-04	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78
25	2018-10-09	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
1	2018-10-01	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
7	2018-10-03	TMAX	GHCND:USW00014732	,,W,2400	25.0	25	77.00	77
27	2018-10-10	TAVG	GHCND:USW00014732	H,,S,	23.8	23	74.84	74
30	2018-10-11	TAVG	GHCND:USW00014732	H,,S,	23.4	23	74.12	74

```
df.sort_values(by=['temp_C', 'date'], ascending=False).head(10)
```

	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
28	2018-10-10	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
19	2018-10-07	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
31	2018-10-11	TMAX	GHCND:USW00014732	,,W,2400	26.7	26	80.06	80
10	2018-10-04	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78
4	2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78
25	2018-10-09	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
1	2018-10-01	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
7	2018-10-03	TMAX	GHCND:USW00014732	,,W,2400	25.0	25	77.00	77
27	2018-10-10	TAVG	GHCND:USW00014732	H,,S,	23.8	23	74.84	74
30	2018-10-11	TAVG	GHCND:USW00014732	H,,S,	23.4	23	74.12	74

```
df.nlargest(n=5, columns='temp_C')
```

	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
19	2018-10-07	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
28	2018-10-10	TMAX	GHCND:USW00014732	,,W,2400	27.8	27	82.04	82
31	2018-10-11	TMAX	GHCND:USW00014732	,,W,2400	26.7	26	80.06	80
4	2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78
10	2018-10-04	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78

```
df.nsmallest(n=5, columns=['temp_C','date'])
```

	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
65	2018-10-22	TMIN	GHCND:USW00014732	,,W,2400	5.6	5	42.08	42
77	2018-10-26	TMIN	GHCND:USW00014732	,,W,2400	5.6	5	42.08	42
62	2018-10-21	TMIN	GHCND:USW00014732	,,W,2400	6.1	6	42.98	42
74	2018-10-25	TMIN	GHCND:USW00014732	,,W,2400	6.1	6	42.98	42
53	2018-10-18	TMIN	GHCND:USW00014732	,,W,2400	6.7	6	44.06	44

```
df.sample(5, random_state=0).index
```

```
Int64Index([2, 30, 55, 16, 13], dtype='int64')
```

```
df.sample(5, random_state=0).sort_index().index
```

```
Int64Index([2, 13, 16, 30, 55], dtype='int64')
```

```
df.sort_index(axis=1).head()
```

	datatype	date	flags	station	temp_C	temp_C_whole	temp_F	temp_F_whole
0	TAVG	2018-10-01	H,,S,	GHCND:USW00014732	21.2	21	70.16	70
1	TMAX	2018-10-01	,,W,2400	GHCND:USW00014732	25.6	25	78.08	78
2	TMIN	2018-10-01	,,W,2400	GHCND:USW00014732	18.3	18	64.94	64
3	TAVG	2018-10-02	H,,S,	GHCND:USW00014732	22.7	22	72.86	72
4	TMAX	2018-10-02	,,W,2400	GHCND:USW00014732	26.1	26	78.98	78

```
df.sort_index(axis=1).head().loc[:,'temp_C':'temp_F_whole']
```

	temp_C	temp_C_whole	temp_F	temp_F_whole
0	21.2	21	70.16	70
1	25.6	25	78.08	78
2	18.3	18	64.94	64
3	22.7	22	72.86	72
4	26.1	26	78.98	78

```
df.equals(df.sort_values(by='temp_C'))
```

```
False
```

```
df.equals(df.sort_values(by='temp_C').sort_index())
```

```
True
```

```
df[df.datatype == 'TAVG'].head().reset_index()
```

	index	date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
0	0	2018-10-01	TAVG	GHCND:USW00014732	H,,S,	21.2	21	70.16	70
1	3	2018-10-02	TAVG	GHCND:USW00014732	H,,S,	22.7	22	72.86	72
2	6	2018-10-03	TAVG	GHCND:USW00014732	H,,S,	21.8	21	71.24	71
3	9	2018-10-04	TAVG	GHCND:USW00014732	H,,S,	21.3	21	70.34	70
4	12	2018-10-05	TAVG	GHCND:USW00014732	H,,S,	20.3	20	68.54	68

```
df.set_index('date', inplace=True)
df.head()
```

date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
2018-10-01	TAVG	GHCND:USW00014732	H,,S,	21.2	21	70.16	70
2018-10-01	TMAX	GHCND:USW00014732	,,W,2400	25.6	25	78.08	78
2018-10-01	TMIN	GHCND:USW00014732	,,W,2400	18.3	18	64.94	64
2018-10-02	TAVG	GHCND:USW00014732	H,,S,	22.7	22	72.86	72
2018-10-02	TMAX	GHCND:USW00014732	,,W,2400	26.1	26	78.98	78

Next steps: View recommended plots

```
df['2018-10-11':'2018-10-12']
```

date	datatype	station	flags	temp_C	temp_C_whole	temp_F	temp_F_whole
2018-10-11	TAVG	GHCND:USW00014732	H,,S,	23.4	23	74.12	74
2018-10-11	TMAX	GHCND:USW00014732	,,W,2400	26.7	26	80.06	80
2018-10-11	TMIN	GHCND:USW00014732	,,W,2400	21.7	21	71.06	71
2018-10-12	TAVG	GHCND:USW00014732	H,,S,	18.3	18	64.94	64
2018-10-12	TMAX	GHCND:USW00014732	,,W,2400	22.2	22	71.96	71
2018-10-12	TMIN	GHCND:USW00014732	,,W,2400	12.2	12	53.96	53

```
sp = pd.read_csv(
    'sp500.csv', index_col='date', parse_dates=True
).drop(columns=['adj_close'])

sp.head(10).assign(
    day_of_week=lambda x: x.index.day_name()
)
```

date	high	low	open	close	volume	day_of_week
2017-01-03	2263.879883	2245.129883	2251.570068	2257.830078	3770530000	Tuesday
2017-01-04	2272.820068	2261.600098	2261.600098	2270.750000	3764890000	Wednesday
2017-01-05	2271.500000	2260.449951	2268.179932	2269.000000	3761820000	Thursday
2017-01-06	2282.100098	2264.060059	2271.139893	2276.979980	3339890000	Friday
2017-01-09	2275.489990	2268.899902	2273.590088	2268.899902	3217610000	Monday
2017-01-10	2279.270020	2265.270020	2269.719971	2268.899902	3638790000	Tuesday
2017-01-11	2275.320068	2260.830078	2268.600098	2275.320068	3620410000	Wednesday
2017-01-12	2271.780029	2254.250000	2271.139893	2270.439941	3462130000	Thursday
2017-01-13	2278.679932	2271.510010	2272.739990	2274.639893	3081270000	Friday
2017-01-17	2272.080078	2262.810059	2269.139893	2267.889893	3584990000	Tuesday

```
bitcoin
```

date	open	high	low	close	volume
2017-01-01	963.66	1003.08	958.70	998.33	147775008
2017-01-02	998.62	1031.39	996.70	1021.75	222184992
2017-01-03	1021.60	1044.08	1021.60	1043.84	185168000
2017-01-04	1044.40	1159.42	1044.40	1154.73	344945984
2017-01-05	1156.73	1191.10	910.42	1013.38	510199008
...	...	...	...	...	...
2018-12-27	3854.69	3874.42	3645.45	3654.83	5130222366
2018-12-28	3653.13	3956.14	3642.63	3923.92	5631554348
2018-12-29	3932.49	3963.76	3820.41	3820.41	4991655917
2018-12-30	3822.38	3901.91	3797.22	3865.95	4770578575
2018-12-31	3866.84	3868.74	3725.87	3742.70	4661840806

730 rows × 5 columns

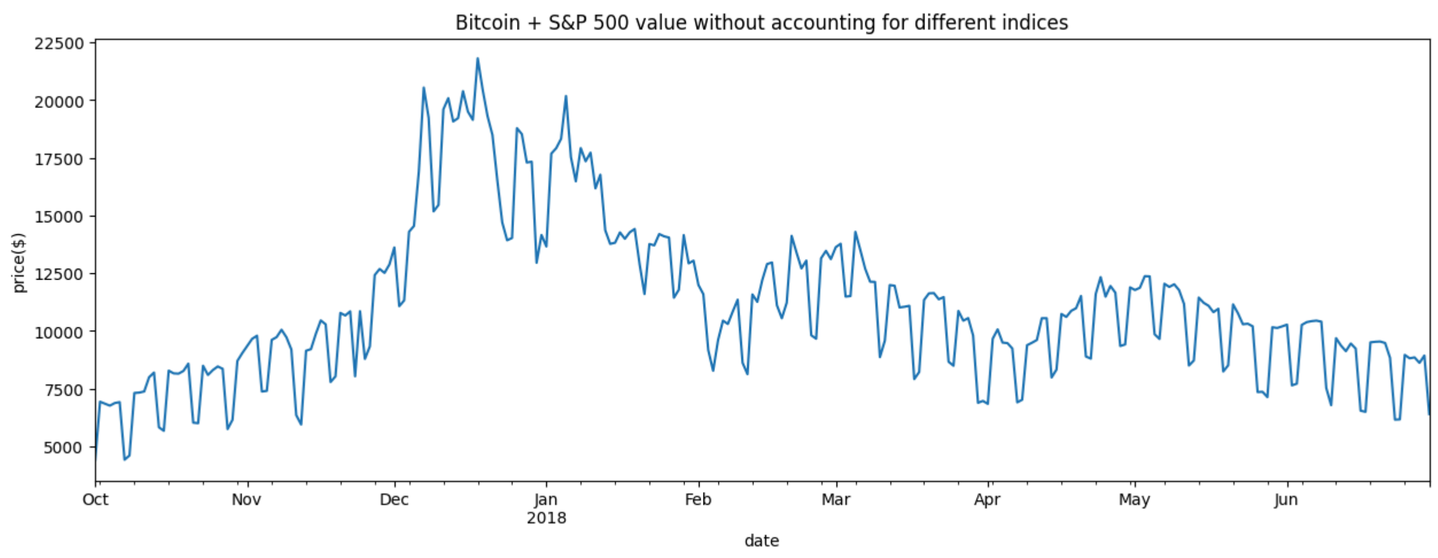
Next steps: View recommended plots

```
bitcoin = pd.read_csv(
    'bitcoin.csv', index_col ='date', parse_dates=True
).drop(columns=['market_cap'])

portfolio = pd.concat(
    [sp, bitcoin], sort=False
).groupby(pd.Grouper(freq='D')).sum()

portfolio.head(10).assign(
    day_of_week=lambda x: x.index.day_name()
)
```

date	high	low	open	close	volume	day_of_week
2017-01-01	1003.080000	958.700000	963.660000	998.330000	147775008	Sunday
2017-01-02	1031.390000	996.700000	998.620000	1021.750000	222184992	Monday
2017-01-03	3307.959883	3266.729883	3273.170068	3301.670078	3955698000	Tuesday
2017-01-04	3432.240068	3306.000098	3306.000098	3425.480000	4109835984	Wednesday
2017-01-05	3462.600000	3170.869951	3424.909932	3282.380000	4272019008	Thursday
2017-01-06	3328.910098	3148.000059	3285.379893	3179.179980	3691766000	Friday
2017-01-07	908.590000	823.560000	903.490000	908.590000	279550016	Saturday
2017-01-08	942.720000	887.250000	908.170000	911.200000	158715008	Sunday
2017-01-09	3189.179990	3148.709902	3186.830088	3171.729902	3359486992	Monday
2017-01-10	3194.140020	3166.330020	3172.159971	3176.579902	3754598000	Tuesday

```
import matplotlib.pyplot as plt
```

```
portfolio['2017-Q4':'2018-Q2'].plot(
    y='close', figsize=(15, 5), legend=False,
    title='Bitcoin + S&P 500 value without accounting for different indices'
) # plot the closing price from Q4 2017 through Q2 2018
plt.ylabel('price($)') # label the y-axis
plt.show()
```




```
sp.reindex(bitcoin.index).head(10).assign(
    day_of_week=lambda x: x.index.day_name()
)
```

date	high	low	open	close	volume	day_of_week
2017-01-01	NaN	NaN	NaN	NaN	NaN	Sunday
2017-01-02	NaN	NaN	NaN	NaN	NaN	Monday
2017-01-03	2263.879883	2245.129883	2251.570068	2257.830078	3.770530e+09	Tuesday
2017-01-04	2272.820068	2261.600098	2261.600098	2270.750000	3.764890e+09	Wednesday
2017-01-05	2271.500000	2260.449951	2268.179932	2269.000000	3.761820e+09	Thursday
2017-01-06	2282.100098	2264.060059	2271.139893	2276.979980	3.339890e+09	Friday
2017-01-07	NaN	NaN	NaN	NaN	NaN	Saturday
2017-01-08	NaN	NaN	NaN	NaN	NaN	Sunday
2017-01-09	2275.489990	2268.899902	2273.590088	2268.899902	3.217610e+09	Monday
2017-01-10	2279.270020	2265.270020	2269.719971	2268.899902	3.638790e+09	Tuesday

```
sp.reindex(
    bitcoin.index, method='ffill'
).head(10).assign(
    day_of_week=lambda x: x.index.day_name()
)
```

date	high	low	open	close	volume	day_of_week
2017-01-01	NaN	NaN	NaN	NaN	NaN	Sunday
2017-01-02	NaN	NaN	NaN	NaN	NaN	Monday
2017-01-03	2263.879883	2245.129883	2251.570068	2257.830078	3.770530e+09	Tuesday
2017-01-04	2272.820068	2261.600098	2261.600098	2270.750000	3.764890e+09	Wednesday
2017-01-05	2271.500000	2260.449951	2268.179932	2269.000000	3.761820e+09	Thursday
2017-01-06	2282.100098	2264.060059	2271.139893	2276.979980	3.339890e+09	Friday
2017-01-07	2282.100098	2264.060059	2271.139893	2276.979980	3.339890e+09	Saturday
2017-01-08	2282.100098	2264.060059	2271.139893	2276.979980	3.339890e+09	Sunday
2017-01-09	2275.489990	2268.899902	2273.590088	2268.899902	3.217610e+09	Monday
2017-01-10	2279.270020	2265.270020	2269.719971	2268.899902	3.638790e+09	Tuesday

```
import numpy as np

sp_reindexed = sp.reindex(
    bitcoin.index
).assign(
    volume=lambda x: x.volume.fillna(0), # put 0 when market is closed
    close=lambda x: x.close.fillna(method='ffill'), # carry this forward
    # take the closing price if these aren't available
    open=lambda x: np.where(x.open.isnull(), x.close, x.open),
    high=lambda x: np.where(x.high.isnull(), x.close, x.high),
    low=lambda x: np.where(x.low.isnull(), x.close, x.low)
)
sp_reindexed.head(10).assign(
    day_of_week=lambda x: x.index.day_name()
)
```

date	high	low	open	close	volume	day_of_week
2017-01-01	NaN	NaN	NaN	NaN	0.000000e+00	Sunday
2017-01-02	NaN	NaN	NaN	NaN	0.000000e+00	Monday
2017-01-03	2263.879883	2245.129883	2251.570068	2257.830078	3.770530e+09	Tuesday
2017-01-04	2272.820068	2261.600098	2261.600098	2270.750000	3.764890e+09	Wednesday
2017-01-05	2271.500000	2260.449951	2268.179932	2269.000000	3.761820e+09	Thursday
2017-01-06	2282.100098	2264.060059	2271.139893	2276.979980	3.339890e+09	Friday
2017-01-07	2276.979980	2276.979980	2276.979980	2276.979980	0.000000e+00	Saturday
2017-01-08	2276.979980	2276.979980	2276.979980	2276.979980	0.000000e+00	Sunday
2017-01-09	2275.489990	2268.899902	2273.590088	2268.899902	3.217610e+09	Monday
2017-01-10	2279.270020	2265.270020	2269.719971	2268.899902	3.638790e+09	Tuesday

```
# every day's closing price = S&P 500 close adjusted for market closure + Bitcoin close (same for other metrics)
fixed_portfolio = pd.concat([sp_reindexed, bitcoin], sort=False).groupby(pd.Grouper(freq='D')).sum()

ax = fixed_portfolio['2017-Q4':'2018-Q2'].plot(
    y='close', label='reindexed portfolio of S&P 500 + Bitcoin', figsize=(15, 5), linewidth = 2,
    title = 'Reindexed portfolio vs. portfolio with mismatches indices'
)  # plot the reindexed portfolio's closing price from Q4 2017 through Q2 2018

portfolio['2017-Q4':'2018-Q2'].plot(
    y='close', ax=ax, linestyle='--', label='portfolio of S&P 500 + Bitcoin w/o reindexing'
).set_ylabel('price ($)') # add line for original portfolio for comparison and label y-axis

plt.show() # show the plot
```