



Double-click (or enter) to edit

```
1 import pandas as pd
2 df = pd.read_csv('sample_data/nyc_temperatures.csv')
3 df.head()
4
```

|   | 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](#)

```
1 df.columns

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

```
1 df.rename(
2 columns={
3 'value' : 'temp_C',
4 'attributes' : 'flags'
5 }, inplace=True
6 )
```

```
1 df.columns

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

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

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

```
1 df.dtypes

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

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

```
<ipython-input-11-80606e5f8dec>:1: DeprecationWarning: In a future version, `df.iloc[:, i] = newvals` will attempt to set the values in
df.loc[:, 'date'] = pd.to_datetime(df.date)
date          datetime64[ns]
datatype      object
station       object
flags         object
temp_C       float64
dtype: object
```

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

```
<ipython-input-12-f7d3fa946723>:1: FutureWarning: Treating datetime data as categorical rather than numeric in `.describe` is deprecated
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
```

```
1 pd.date_range(start='2018-10-25', periods=2, freq='D').tz_localize('EST')
2
3 DatetimeIndex(['2018-10-25 00:00:00-05:00', '2018-10-26 00:00:00-05:00'], dtype='datetime64[ns, EST]', freq=None)
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```

|                           | datatype | station           | attributes | value |
|---------------------------|----------|-------------------|------------|-------|
| date                      |          |                   |            |       |
| 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

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

|                           | datatype | station           | attributes | value |
|---------------------------|----------|-------------------|------------|-------|
| date                      |          |                   |            |       |
| 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  |

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

[illegible]

```
1 eastern.to period('M').to timestamp().index
```

[illegible]

```

    '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',
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    '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',
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    '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)

```

```

1 df = pd.read_csv('sample_data/nyc_temperatures.csv').rename(
2 columns={
3 'value' : 'temp_C',
4 'attributes' : 'flags'
5 }
6 )
7 new_df = df.assign(
8 date=pd.to_datetime(df.date),
9 temp_F=(df.temp_C * 9/5) + 32
10 )
11 new_df.dtypes
12

```

```

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

```

```

1 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](#)

```

1 df = df.assign(
2 date=pd.to_datetime(df.date),
3 temp_C_whole=df.temp_C.astype('int'),
4 temp_F=(df.temp_C * 9/5) + 32,
5 temp_F_whole=lambda x: x.temp_F.astype('int')
6 )
7 df.head()
8

```

|   | date       | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_wh |
|---|------------|----------|-------------------|---------|--------|--------------|--------|-----------|
| 0 | 2018-10-01 | TAVG     | GHCND:USW00014732 | H,,S,   | 21.2   | 21           | 70.16  |           |
| 1 | 2018-10-01 | TMAX     | GHCND:USW00014732 | „W,2400 | 25.6   | 25           | 78.08  |           |
| 2 | 2018-10-01 | TMIN     | GHCND:USW00014732 | „W,2400 | 18.3   | 18           | 64.94  |           |

Next steps: [View recommended plots](#)

```

1 df_with_categories = df.assign(
2 station=df.station.astype('category'),
3 datatype=df.datatype.astype('category')
4 )
5 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

```

```

1 pd.Categorical(
2 ['med', 'med', 'low', 'high'],
3 categories=['low', 'med', 'high'],
4 ordered=True
5 )

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

```

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

|    | date       | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_w |
|----|------------|----------|-------------------|---------|--------|--------------|--------|----------|
| 19 | 2018-10-07 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 28 | 2018-10-10 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 31 | 2018-10-11 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.7   | 26           | 80.06  |          |
| 4  | 2018-10-02 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.1   | 26           | 78.98  |          |
| 10 | 2018-10-04 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.1   | 26           | 78.98  |          |
| 25 | 2018-10-09 | TMAX     | GHCND:USW00014732 | „W,2400 | 25.6   | 25           | 78.08  |          |
| 1  | 2018-10-01 | TMAX     | GHCND:USW00014732 | „W,2400 | 25.6   | 25           | 78.08  |          |

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

|    | date       | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_w |
|----|------------|----------|-------------------|---------|--------|--------------|--------|----------|
| 28 | 2018-10-10 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 19 | 2018-10-07 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 31 | 2018-10-11 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.7   | 26           | 80.06  |          |
| 10 | 2018-10-04 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.1   | 26           | 78.98  |          |
| 4  | 2018-10-02 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.1   | 26           | 78.98  |          |
| 25 | 2018-10-09 | TMAX     | GHCND:USW00014732 | „W,2400 | 25.6   | 25           | 78.08  |          |
| 1  | 2018-10-01 | TMAX     | GHCND:USW00014732 | „W,2400 | 25.6   | 25           | 78.08  |          |

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

|    | date       | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_w |
|----|------------|----------|-------------------|---------|--------|--------------|--------|----------|
| 19 | 2018-10-07 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 28 | 2018-10-10 | TMAX     | GHCND:USW00014732 | „W,2400 | 27.8   | 27           | 82.04  |          |
| 31 | 2018-10-11 | TMAX     | GHCND:USW00014732 | „W,2400 | 26.7   | 26           | 80.06  |          |
| 4  | 2018-      | TMAX     | GHCND:USW00014732 | „W,2400 | 26.1   | 26           | 78.98  |          |

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

|    | date       | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_w |
|----|------------|----------|-------------------|---------|--------|--------------|--------|----------|
| 65 | 2018-10-22 | TMIN     | GHCND:USW00014732 | „W,2400 | 5.6    | 5            | 42.08  |          |
| 77 | 2018-10-26 | TMIN     | GHCND:USW00014732 | „W,2400 | 5.6    | 5            | 42.08  |          |
| 62 | 2018-10-21 | TMIN     | GHCND:USW00014732 | „W,2400 | 6.1    | 6            | 42.98  |          |
| 74 | 2018-      | TMIN     | GHCND:USW00014732 | „W,2400 | 6.1    | 6            | 42.98  |          |

```
1 df.sample(5, random_state=0).index
Int64Index([2, 30, 55, 16, 13], dtype='int64')
```

```
1 df.sample(5, random_state=0).sort_index().index
Int64Index([2, 13, 16, 30, 55], dtype='int64')
```

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

|   | datatype | date       | flags   | station           | temp_C | temp_C_whole | temp_F | temp_F_wh |
|---|----------|------------|---------|-------------------|--------|--------------|--------|-----------|
| 0 | TAVG     | 2018-10-01 | H„S,    | GHCND:USW00014732 | 21.2   | 21           | 70.16  |           |
| 1 | TMAX     | 2018-10-01 | „W,2400 | GHCND:USW00014732 | 25.6   | 25           | 78.08  |           |
| 2 | TMIN     | 2018-10-01 | „W,2400 | GHCND:USW00014732 | 18.3   | 18           | 64.94  |           |
| 3 | TAVG     | 2018-      | H„S,    | GHCND:USW00014732 | 22.7   | 22           | 72.86  |           |

```
1 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           |

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

```
1 df.equals(df.sort_values(by='temp_C').sort_index())
2
True
```

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

|   | index | date       | datatype | station           | flags | temp_C | temp_C_whole | temp_F | temp |
|---|-------|------------|----------|-------------------|-------|--------|--------------|--------|------|
| 0 | 0     | 2018-10-01 | TAVG     | GHCND:USW00014732 | H,,S, | 21.2   | 21           | 70.16  |      |
| 1 | 3     | 2018-10-02 | TAVG     | GHCND:USW00014732 | H,,S, | 22.7   | 22           | 72.86  |      |
| 2 | 6     | 2018-10-03 | TAVG     | GHCND:USW00014732 | H,,S, | 21.8   | 21           | 71.24  |      |
| 3 | 9     | 2018-10-04 | TAVG     | GHCND:USW00014732 | H,,S, | 21.2   | 21           | 70.16  |      |

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

|            | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_whole |
|------------|----------|-------------------|---------|--------|--------------|--------|--------------|
| date       |          |                   |         |        |              |        |              |
| 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           |

Next steps:

View recommended plots

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

|            | datatype | station           | flags   | temp_C | temp_C_whole | temp_F | temp_F_whole |
|------------|----------|-------------------|---------|--------|--------------|--------|--------------|
| date       |          |                   |         |        |              |        |              |
| 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           |

```
1 sp = pd.read_csv(
2     'sample_data/sp500.csv', index_col='date', parse_dates=True
3 ).drop(columns=['adj_close'])
4 sp.head(10).assign(
5     day_of_week=lambda x: x.index.day_name()
6 )
7
```

|            | high        | low         | open        | close       | volume     | day_of_week |
|------------|-------------|-------------|-------------|-------------|------------|-------------|
| date       |             |             |             |             |            |             |
| 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   |

```

1 bitcoin = pd.read_csv(
2 'sample_data/bitcoin.csv', index_col='date', parse_dates=True
3 ).drop(columns=['market_cap'])
4 # every day's closing price = S&P 500 close + Bitcoin close (same for other metrics)
5 portfolio = pd.concat(
6 [sp, bitcoin], sort=False
7 ).groupby(pd.Grouper(freq='D')).sum()
8 portfolio.head(10).assign(
9 day_of_week=lambda x: x.index.day_name()
10 )
11

```

|            | high        | low         | open        | close       | volume     | day_of_week |
|------------|-------------|-------------|-------------|-------------|------------|-------------|
| date       |             |             |             |             |            |             |
| 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     |

```

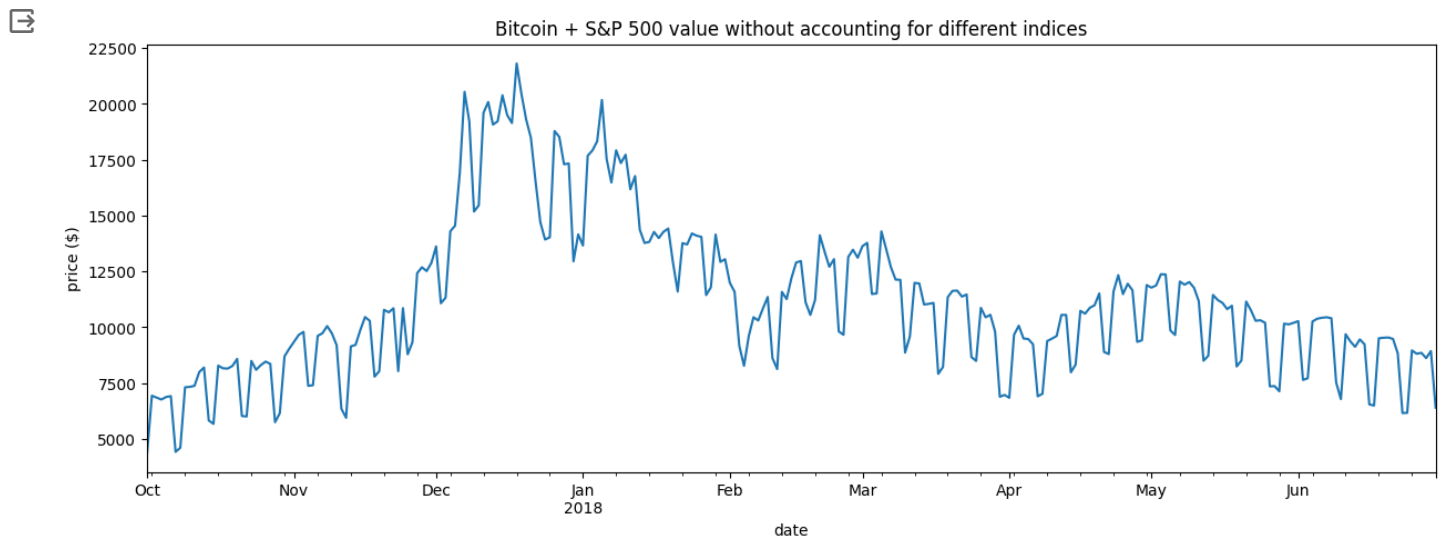
1 import matplotlib.pyplot as plt # we use this module for plotting

```

```

1 portfolio['2017-Q4':'2018-Q2'].plot(
2 y='close', figsize=(15, 5), legend=False,
3 title='Bitcoin + S&P 500 value without accounting for different indices'
4 ) # plot the closing price from Q4 2017 through Q2 2018
5 plt.ylabel('price ($)') # label the y-axis
6 plt.show() # show the plot
7

```



```

1 sp.reindex(bitcoin.index).head(10).assign(
2 day_of_week=lambda x: x.index.day_name()
3 )
4

```

|            | high        | low         | open        | close       | volume       | day_of_week |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|
| date       |             |             |             |             |              |             |
| 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     |

```

1 sp.reindex(
2 bitcoin.index, method='ffill'
3 ).head(10).assign(
4 day_of_week=lambda x: x.index.day_name()
5 )
6

```

|            | high        | low         | open        | close       | volume       | day_of_week |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|
| date       |             |             |             |             |              |             |
| 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     |

```

1 import numpy as np
2 sp_reindexed = sp.reindex(
3 bitcoin.index
4 ).assign(
5 volume=lambda x: x.volume.fillna(0), # put 0 when market is closed
6 close=lambda x: x.close.fillna(method='ffill'), # carry this forward
7 # take the closing price if these aren't available
8 open=lambda x: np.where(x.open.isnull(), x.close, x.open),
9 high=lambda x: np.where(x.high.isnull(), x.close, x.high),
10 low=lambda x: np.where(x.low.isnull(), x.close, x.low)
11 )
12 sp_reindexed.head(10).assign(
13 day_of_week=lambda x: x.index.day_name()
14 )
15

```



|            | high        | low         | open        | close       | volume       | day_of_week |
|------------|-------------|-------------|-------------|-------------|--------------|-------------|
| date       |             |             |             |             |              |             |
| 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   |

```

1 # every day's closing price = S&P 500 close adjusted for market closure + Bitcoin close (same for other metrics)
2 fixed_portfolio = pd.concat([sp_reindexed, bitcoin], sort=False).groupby(pd.Grouper(freq='D')).sum()
3 ax = fixed_portfolio['2017-Q4':'2018-Q2'].plot(
4 y='close', label='reindexed portfolio of S&P 500 + Bitcoin', figsize=(15, 5), linewidth=2,
5 title='Reindexed portfolio vs. portfolio with mismatches indices'
6 ) # plot the reindexed portfolio's closing price from Q4 2017 through Q2 2018
7 portfolio['2017-Q4':'2018-Q2'].plot(
8 y='close', ax=ax, linestyle='--', label='portfolio of S&P 500 + Bitcoin w/o reindexing'
9 ).set_ylabel('price ($)') # add line for original portfolio for comparison and label y-axis
10 plt.show() # show the plot

```

