

Visualizing Time Series Data

Let's go through a few key points of creating nice time visualizations!

```
In [3]: import pandas as pd
import matplotlib.pyplot as plt
import matplotlib inline

# Optional for interactive
# %matplotlib notebook (watch video for full details)

In [4]: mcdon = pd.read_csv('mcdonalds.csv', index_col='Date', parse_dates=True)

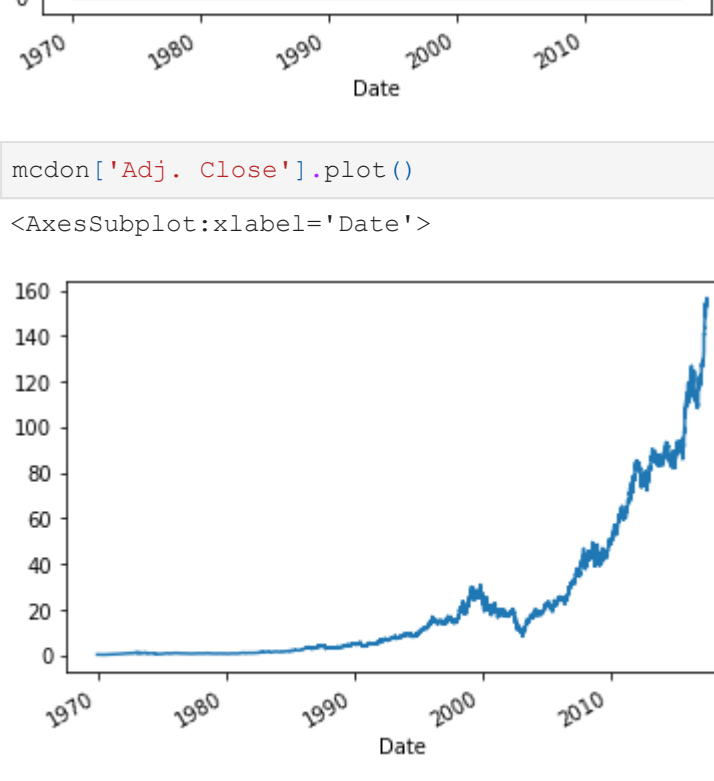
In [5]: mcdon.head()

Out[5]:
```

	Adj. Close	Adj. Volume
Date		
1970-01-02	0.209761	2825604.0
1970-01-05	0.213316	2210449.5
1970-01-06	0.214501	1951168.5
1970-01-07	0.213316	2728768.5
1970-01-08	0.213316	2242404.0

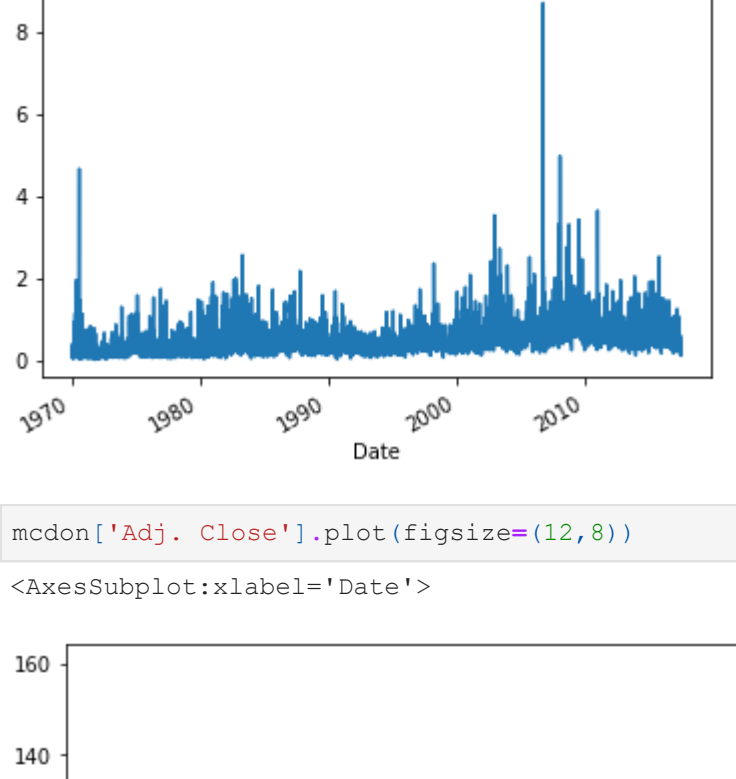
```
In [6]: # Not Good!
mcdon.plot()
```

```
Out[6]: <AxesSubplot: xlabel='Date'>
```



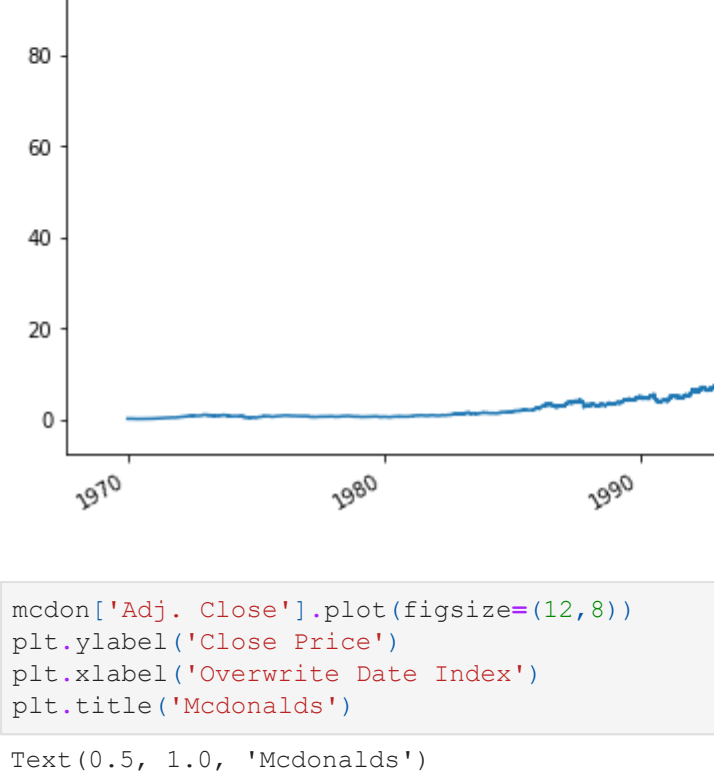
```
In [7]: mcdon['Adj. Close'].plot()
```

```
Out[7]: <AxesSubplot: xlabel='Date'>
```



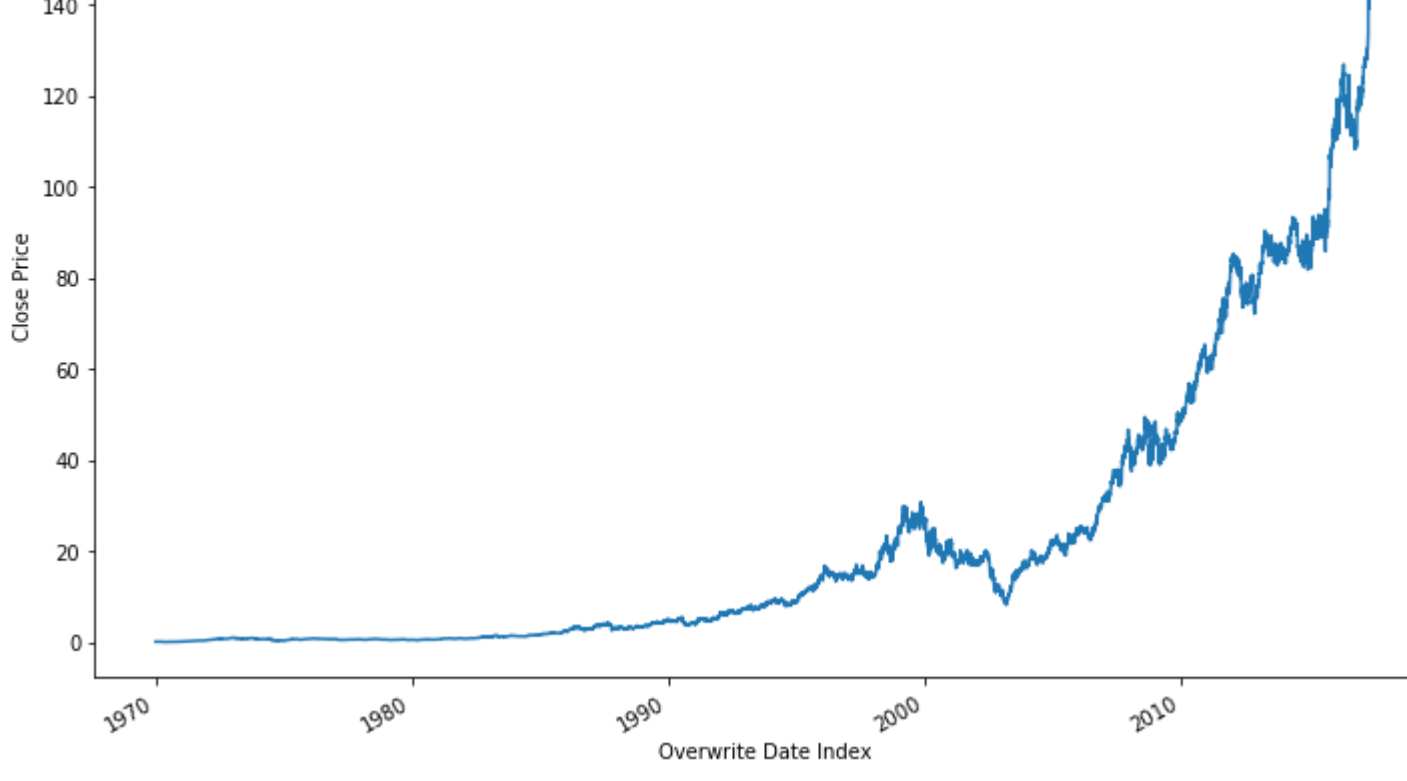
```
In [8]: mcdon['Adj. Volume'].plot()
```

```
Out[8]: <AxesSubplot: xlabel='Date'>
```



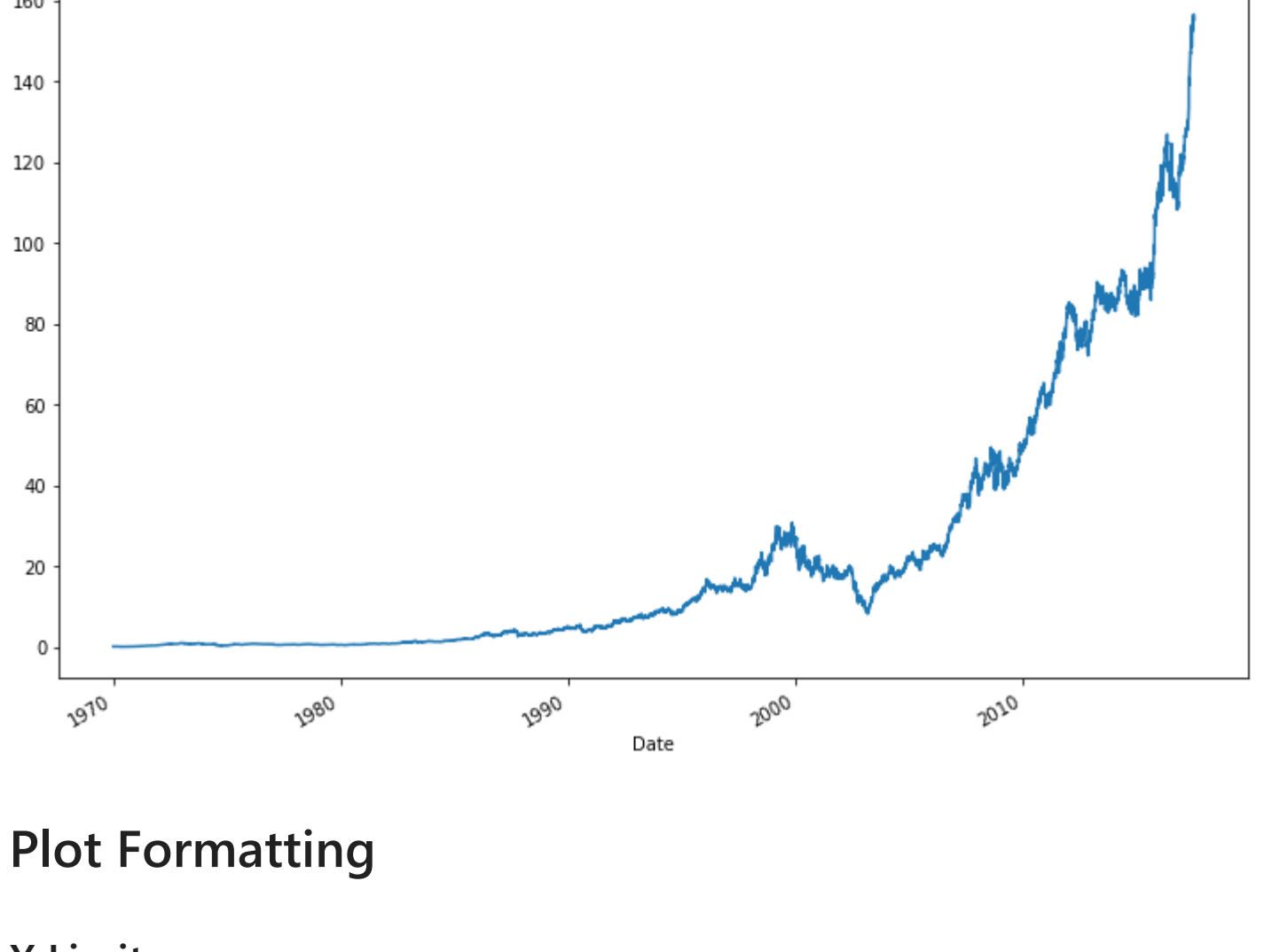
```
In [9]: mcdon['Adj. Close'].plot(figsize=(12,8))

Out[9]: <AxesSubplot: xlabel='Date'>
```

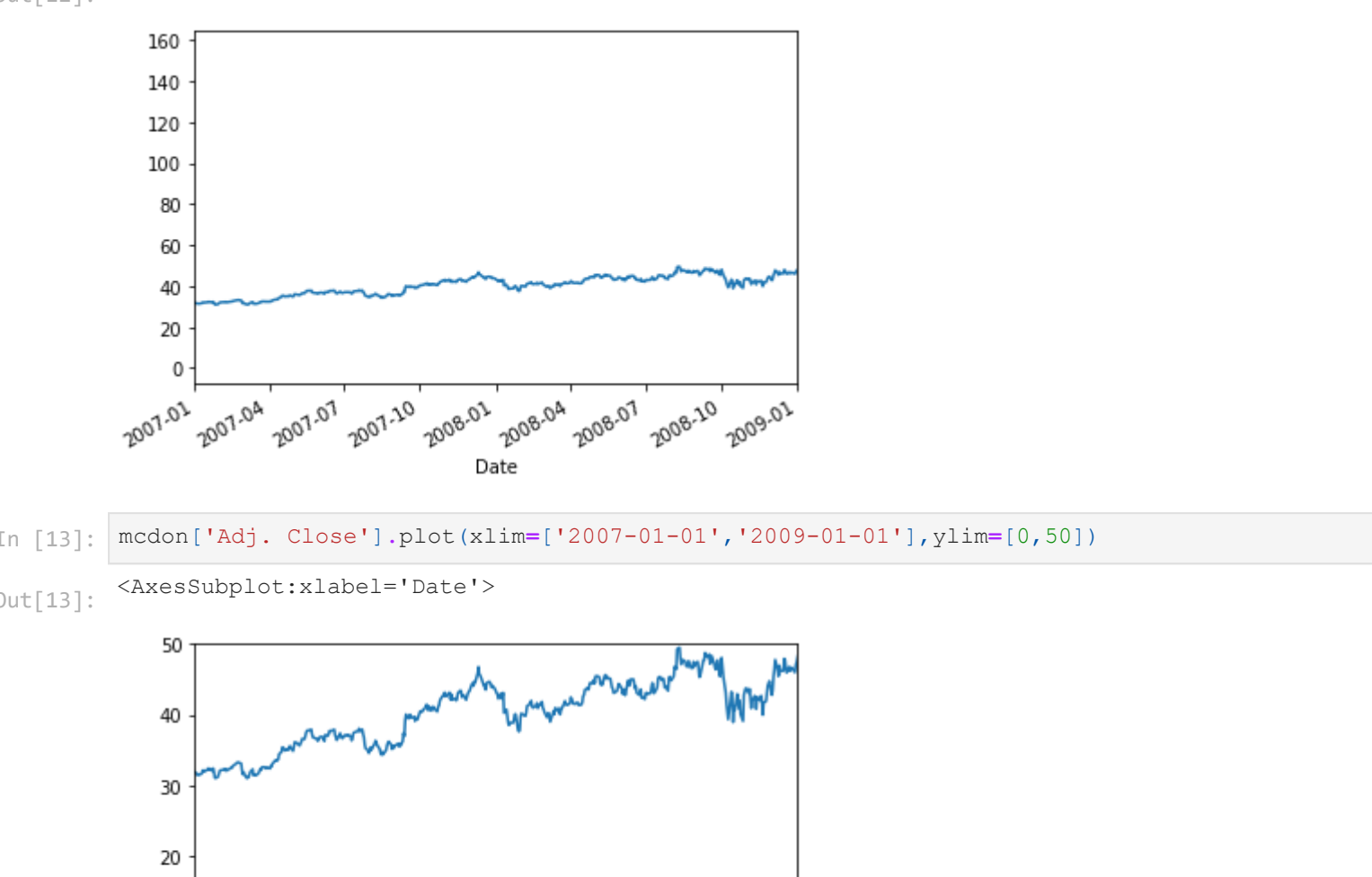


```
In [10]: mcdon['Adj. Close'].plot(figsize=(12,8))
plt.ylabel('Close Price')
plt.xlabel('Override Date Index')
plt.title('McDonalds')
```

```
Out[10]: Text(0.5, 1.0, 'McDonalds')
```



```
In [11]: mcdon['Adj. Close'].plot(figsize=(12,8), title='Pandas Title')
<AxesSubplot: title=('center': 'Pandas Title', xlabel='Date')>
```

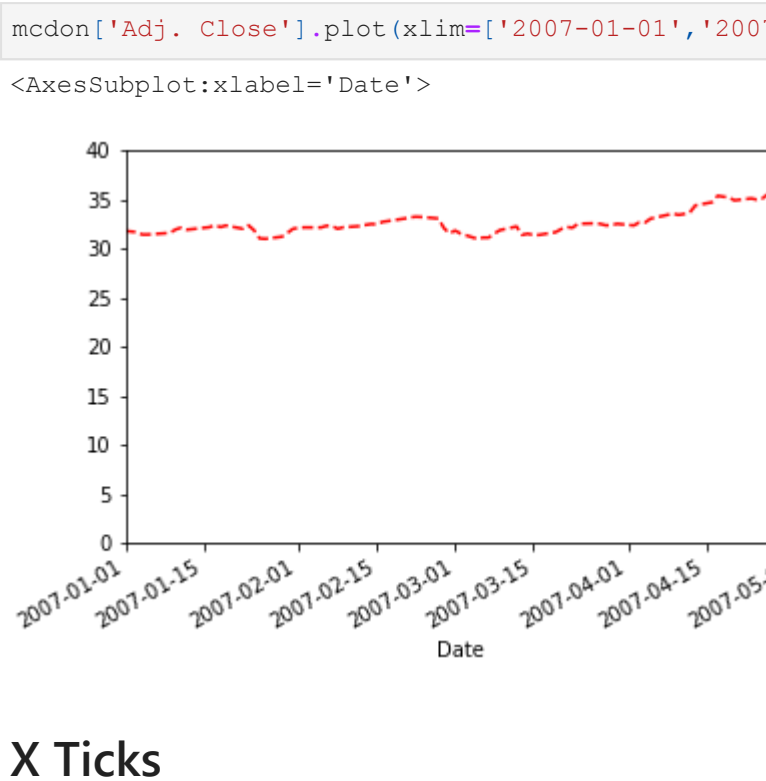


Plot Formatting

X Limits

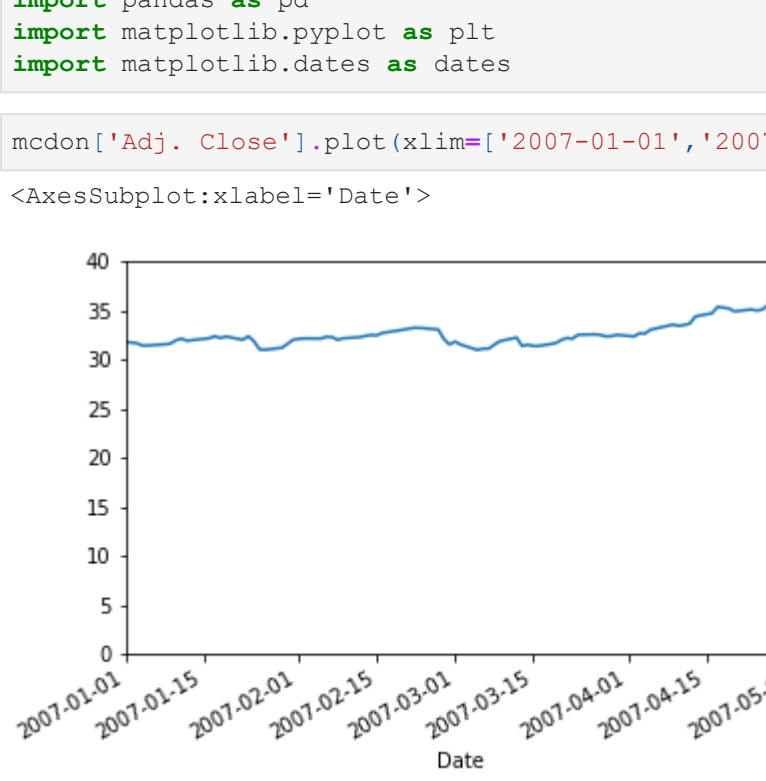
```
In [12]: mcdon['Adj. Close'].plot(xlim=['2007-01-01', '2009-01-01'])

Out[12]: <AxesSubplot: xlabel='Date'>
```



```
In [13]: mcdon['Adj. Close'].plot(xlim=['2007-01-01', '2009-01-01'], ylim=[0,50])

Out[13]: <AxesSubplot: xlabel='Date'>
```



Color and Style

```
In [14]: mcdon['Adj. Close'].plot(xlim=['2007-01-01', '2009-05-01'], ylim=[0,40], ls='--', c='r')

Out[14]: <AxesSubplot: xlabel='Date'>
```



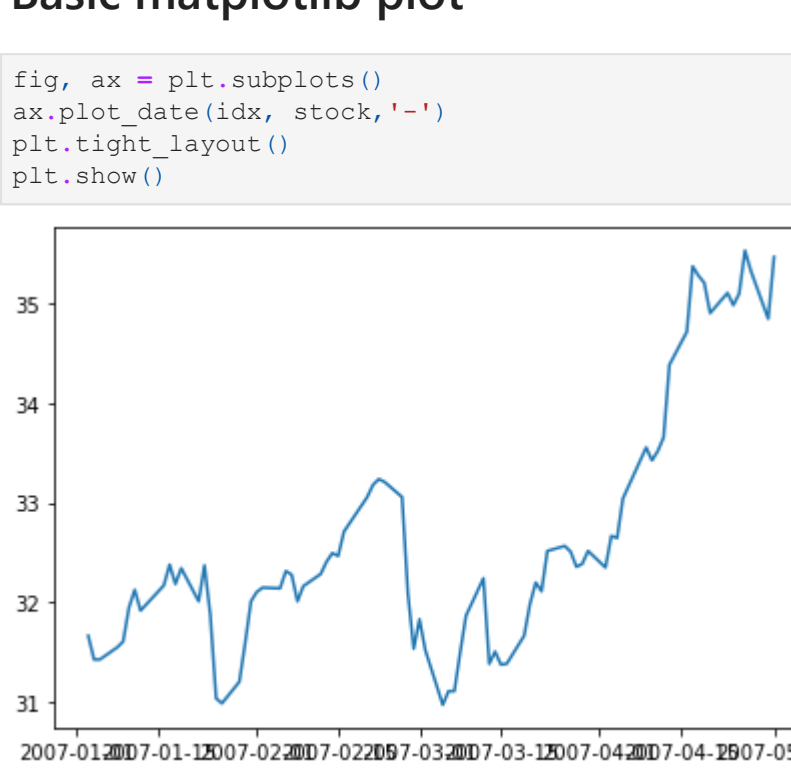
X Ticks

This is where you will need the power of matplotlib to do heavy lifting if you want some serious customization!

```
In [15]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.dates as dates
```

```
In [16]: mcdon['Adj. Close'].plot(xlim=['2007-01-01', '2009-05-01'], ylim=[0,40])

Out[16]: <AxesSubplot: xlabel='Date'>
```



```
In [17]: idx = mcdon.loc['2007-01-01':'2009-05-01'].index
stock = mcdon.loc['2007-01-01':'2009-05-01']['Adj. Close']
```

```
Out[17]: idx
```

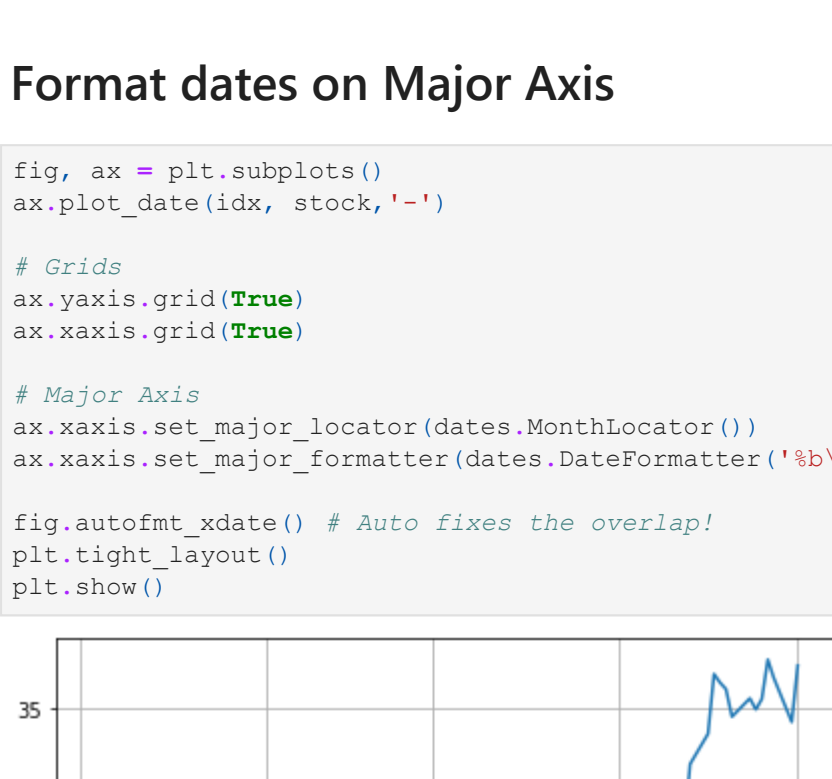
```
Out[18]: DatetimeIndex(['2007-01-03', '2007-01-04', '2007-01-05', '2007-01-08',
                        '2007-01-09', '2007-01-10', '2007-01-11', '2007-01-12',
                        '2007-01-16', '2007-01-17', '2007-01-18', '2007-01-19',
                        '2007-01-22', '2007-01-23', '2007-01-24', '2007-01-25',
                        '2007-01-26', '2007-01-29', '2007-01-30', '2007-01-31',
                        '2007-02-01', '2007-02-02', '2007-02-03', '2007-02-06',
                        '2007-02-07', '2007-02-08', '2007-02-09', '2007-02-12',
                        '2007-02-13', '2007-02-14', '2007-02-15', '2007-02-16',
                        '2007-02-20', '2007-02-21', '2007-02-22', '2007-02-23',
                        '2007-02-26', '2007-02-27', '2007-02-28', '2007-03-01',
                        '2007-03-02', '2007-03-05', '2007-03-06', '2007-03-07',
                        '2007-03-08', '2007-03-09', '2007-03-12', '2007-03-13',
                        '2007-03-14', '2007-03-15', '2007-03-16', '2007-03-19',
                        '2007-03-20', '2007-03-21', '2007-03-22', '2007-03-23',
                        '2007-03-26', '2007-03-27', '2007-03-28', '2007-03-29',
                        '2007-03-30', '2007-04-02', '2007-04-03', '2007-04-04',
                        '2007-04-05', '2007-04-09', '2007-04-10', '2007-04-11',
                        '2007-04-12', '2007-04-13', '2007-04-16', '2007-04-17',
                        '2007-04-18', '2007-04-19', '2007-04-20', '2007-04-23',
                        '2007-04-24', '2007-04-25', '2007-04-26', '2007-04-27',
                        '2007-04-30', '2007-05-01'],
                        dtype='datetime64[ns]', name='Date', freq=None)
```

```
In [19]: stock
```

```
Out[19]: Date
2007-01-03    31.662754
2007-01-04    31.424580
2007-01-05    31.424580
2007-01-08    31.547276
2007-01-09    31.605015
...
2007-04-25    35.098239
2007-04-26    35.531283
2007-04-27    35.329196
2007-04-30    34.845630
2007-05-01    35.466327
Name: Adj. Close, Length: 82, dtype: float64
```

Basic matplotlib plot

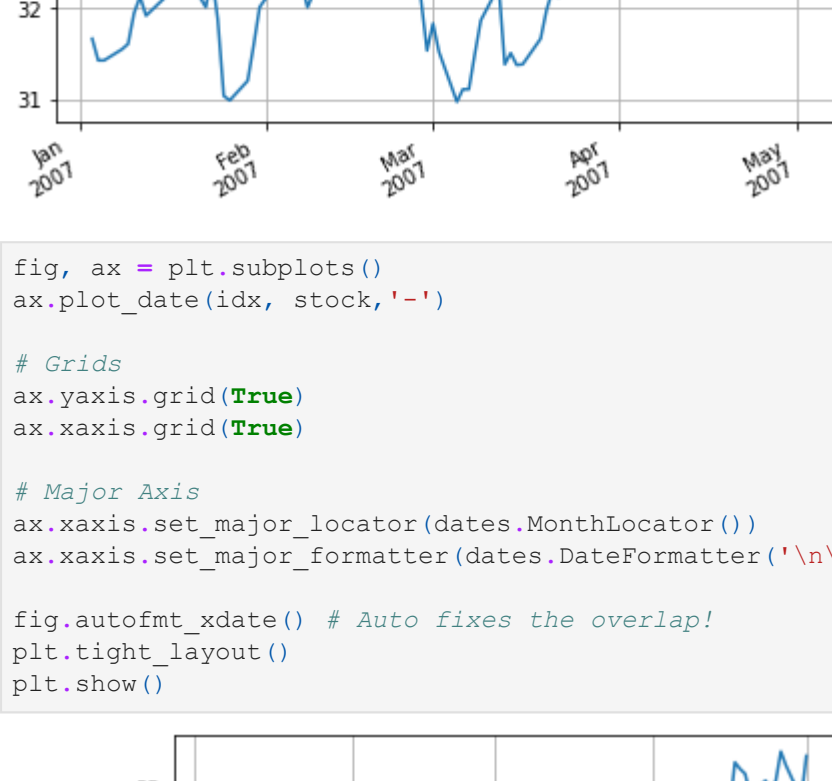
```
In [20]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')
plt.tight_layout()
plt.show()
```



Fix the overlap!

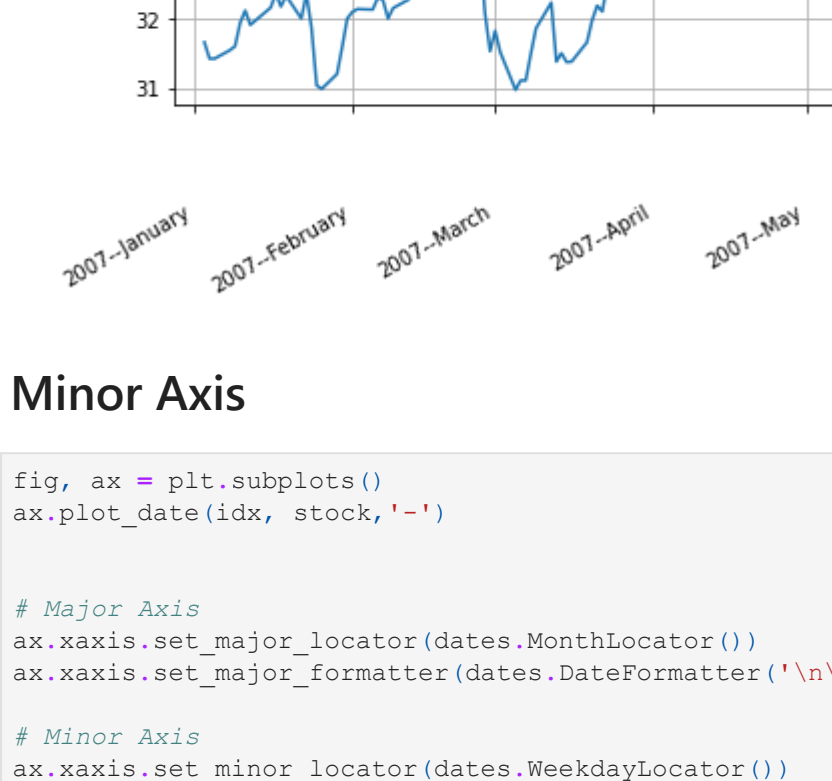
```
In [28]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



Customize grid

```
In [22]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')
ax.yaxis.grid(True)
ax.xaxis.grid(True)
fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



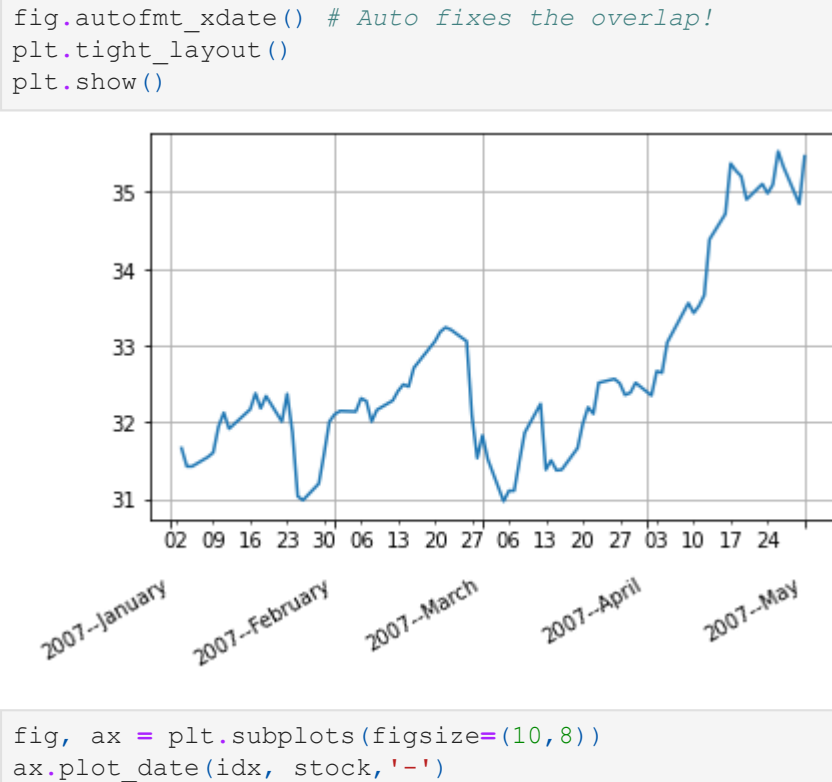
Format dates on Major Axis

```
In [23]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')

# Grids
ax.yaxis.grid(True)
ax.xaxis.grid(True)

# Major Axis
ax.xaxis.set_major_locator(dates.MonthLocator())
ax.xaxis.set_major_formatter(dates.DateFormatter('%b\n%Y'))

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



```
In [24]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')

# Grids
ax.yaxis.grid(True)
ax.xaxis.grid(True)

# Major Axis
ax.xaxis.set_major_locator(dates.MonthLocator())
ax.xaxis.set_major_formatter(dates.DateFormatter('%b\n%Y'))

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



```
In [26]: fig, ax = plt.subplots(figsize=(10,8))
ax.plot_date(idx, stock, '-')

# Major Axis
ax.xaxis.set_major_locator(dates.WeekdayLocator(byweekday=1))
ax.xaxis.set_major_formatter(dates.DateFormatter('%B-%d-%a'))

# Grids
ax.yaxis.grid(True)
ax.xaxis.grid(True)

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



Minor Axis

```
In [25]: fig, ax = plt.subplots()
ax.plot_date(idx, stock, '-')

# Major Axis
ax.xaxis.set_major_locator(dates.MonthLocator())
ax.xaxis.set_major_formatter(dates.DateFormatter('%b\n%Y'))

# Minor Axis
ax.xaxis.set_minor_locator(dates.WeekdayLocator())
ax.xaxis.set_minor_formatter(dates.DateFormatter('%d'))

# Grids
ax.yaxis.grid(True)
ax.xaxis.grid(True)

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```



```
In [26]: fig, ax = plt.subplots(figsize=(10,8))
ax.plot_date(idx, stock, '-')

# Major Axis
ax.xaxis.set_major_locator(dates.WeekdayLocator(byweekday=1))
ax.xaxis.set_major_formatter(dates.DateFormatter('%B-%d-%a'))

# Grids
ax.yaxis.grid(True)
ax.xaxis.grid(True)

fig.autofmt_xdate() # Auto fixes the overlap!
plt.tight_layout()
plt.show()
```


Great job!