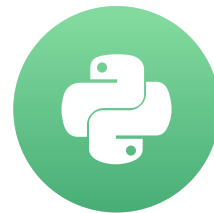


Introduction to Data Visualization with Matplotlib

INTRODUCTION TO DATA VISUALIZATION WITH MATPLOTLIB

A picture is worth a thousand words.



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Data Scientist

Data visualization

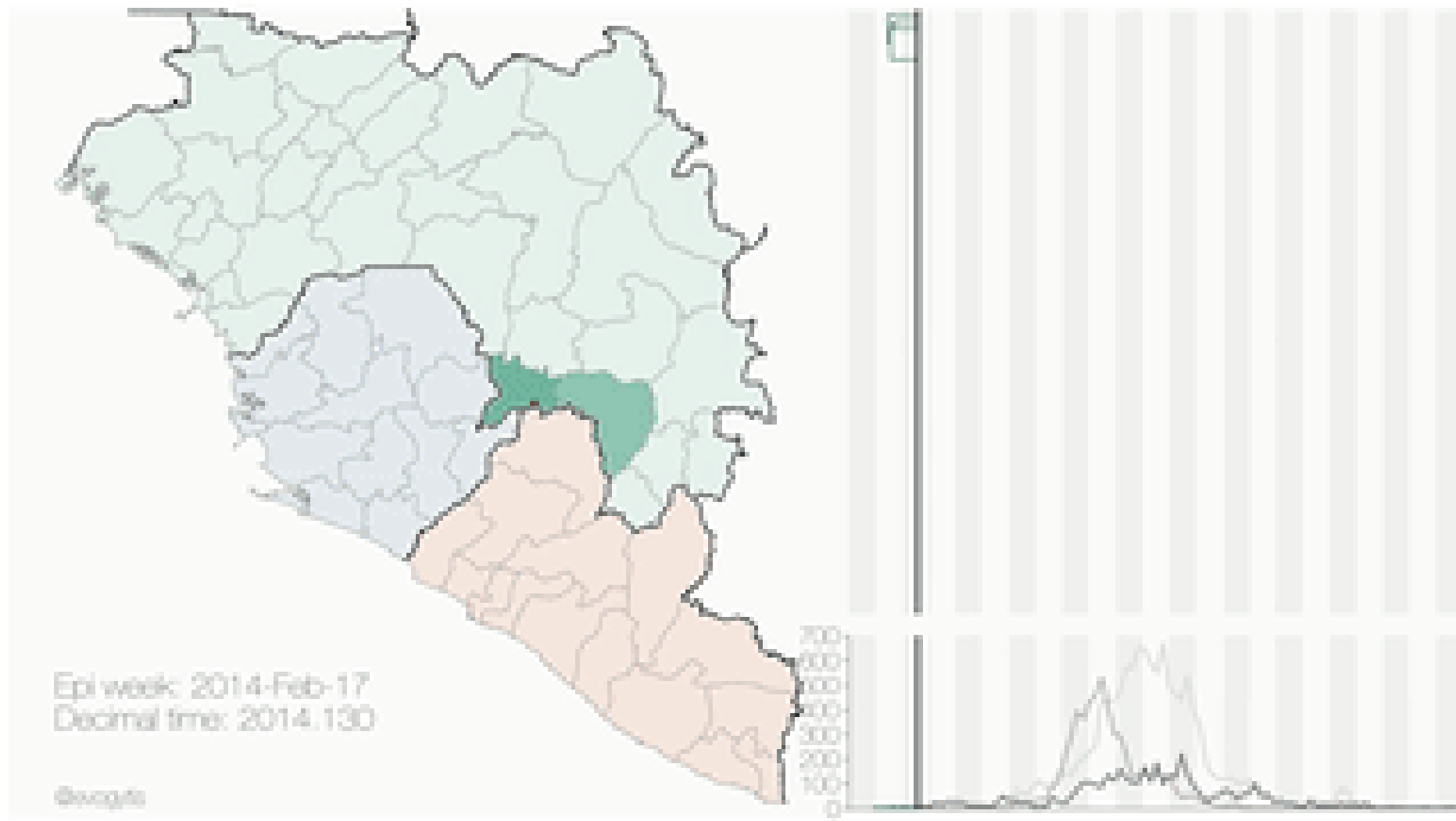


Image credit: [Gytis Dudas](#) and [Andrew Rambaut](#)

Introducing the pyplot interface

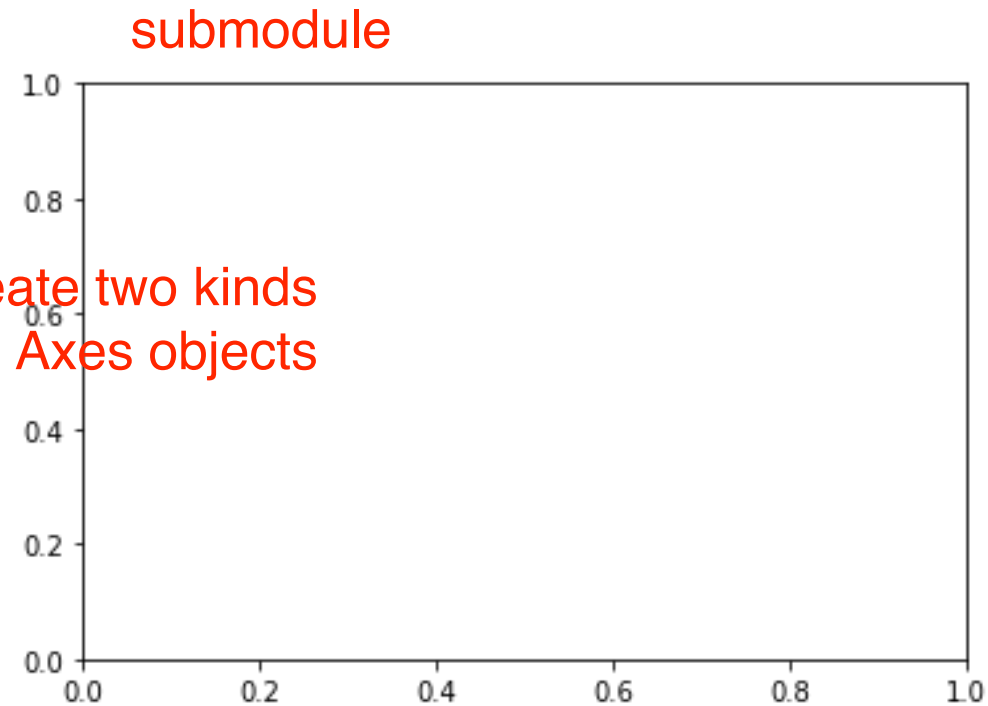
```
import matplotlib.pyplot as plt  
fig, ax = plt.subplots()  
plt.show()
```

use the pyplot interface to create two kinds of objects: Figure objects and Axes objects

The Figure object is a container that holds everything that you see on the page.

The Axes is the part of the page that holds the data.

a figure with empty axes



Adding data to axes

```
seattle_weather["MONTH"]
```

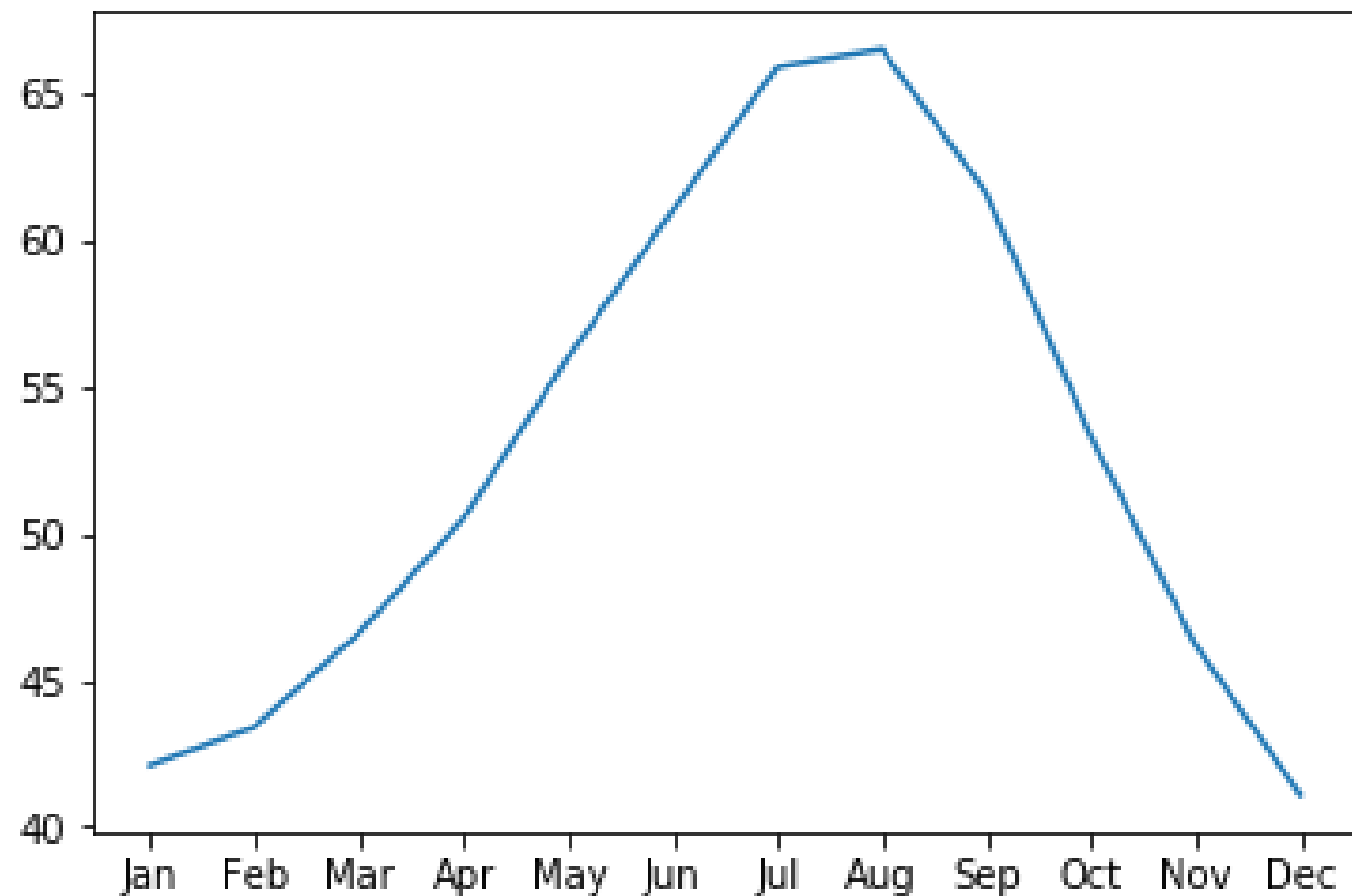
```
DATE
1    Jan
2    Feb
3    Mar
4    Apr
5    May
6    Jun
7    Jul
8    Aug
9    Sep
10   Oct
11   Nov
12   Dec
Name: MONTH, dtype: object
```

```
seattle_weather["MLY-TAVG-NORMAL"]
```

```
1    42.1
2    43.4
3    46.6
4    50.5
5    56.0
6    61.0
7    65.9
8    66.5
9    61.6
10   53.3
11   46.2
12   41.1
Name: MLY-TAVG-NORMAL, dtype: float64
```

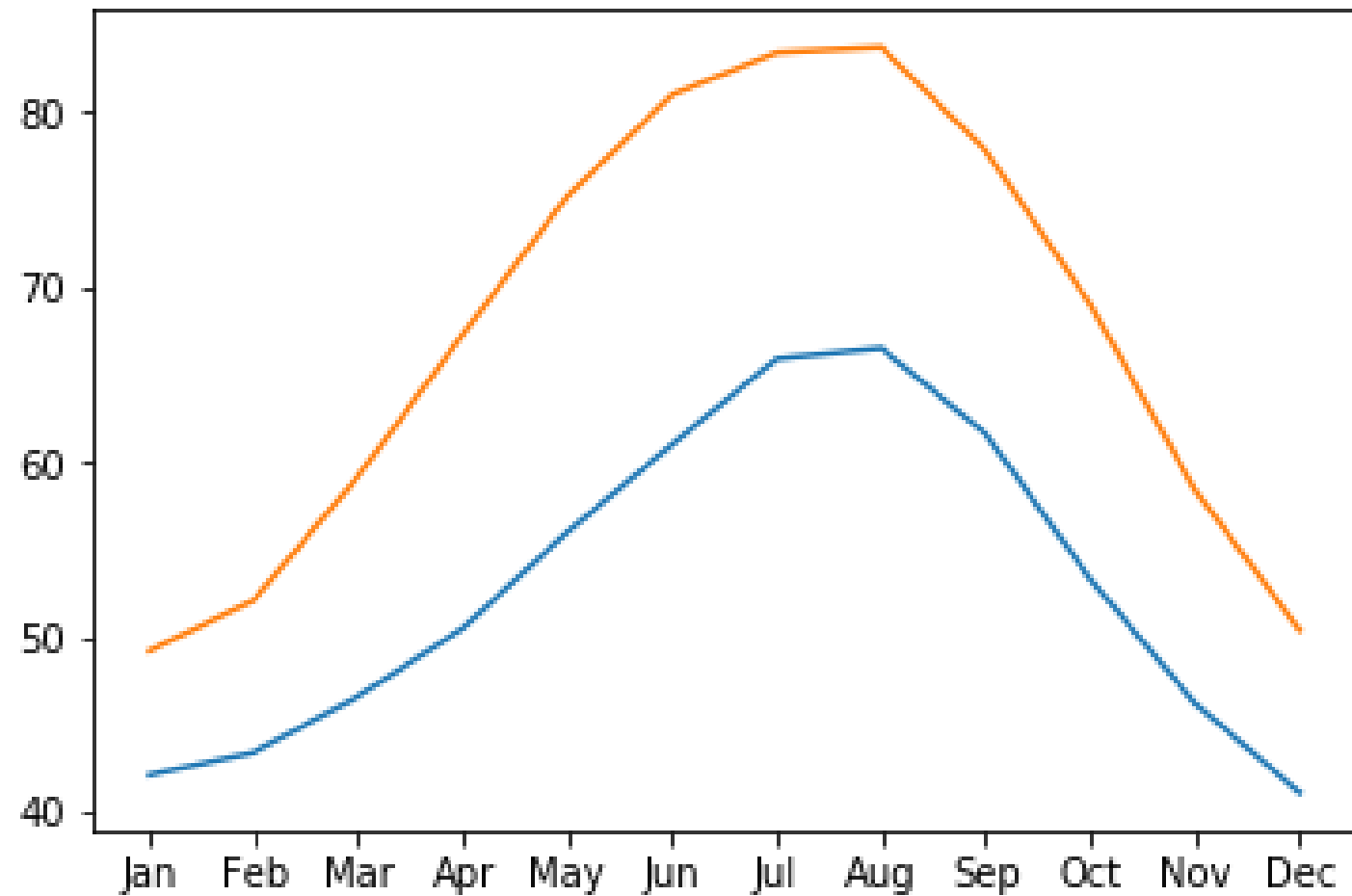
Adding data to axes

```
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-TAVG-NORMAL"]  
plt.show())
```



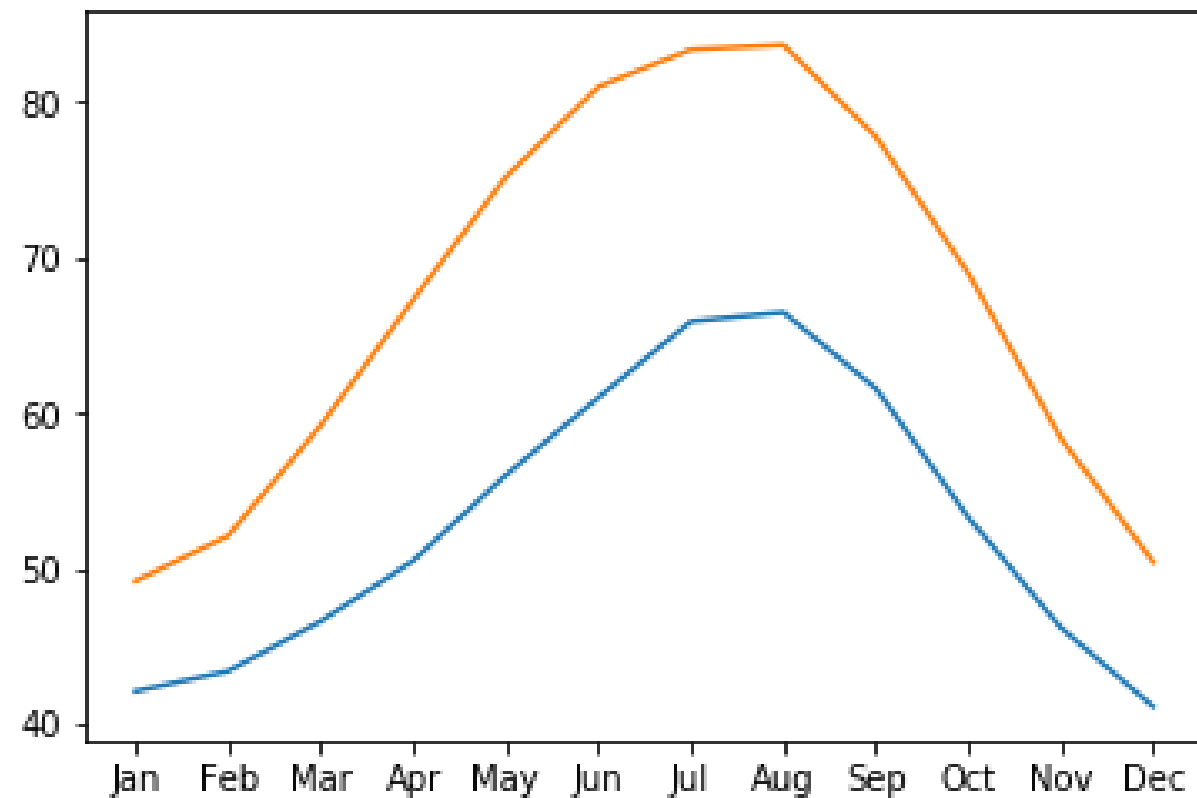
Adding more data

```
ax.plot(austin_weather["MONTH"], austin_weather["MLY-TAVG-NORMAL"])\nplt.show()
```



Putting it all together

```
fig, ax = plt.subplots()
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-TAVG-NORMAL"])
ax.plot(austin_weather["MONTH"], austin_weather["MLY-TAVG-NORMAL"])
plt.show()
```



Practice making a figure!

INTRODUCTION TO DATA VISUALIZATION WITH MATPLOTLIB

Customizing your plots

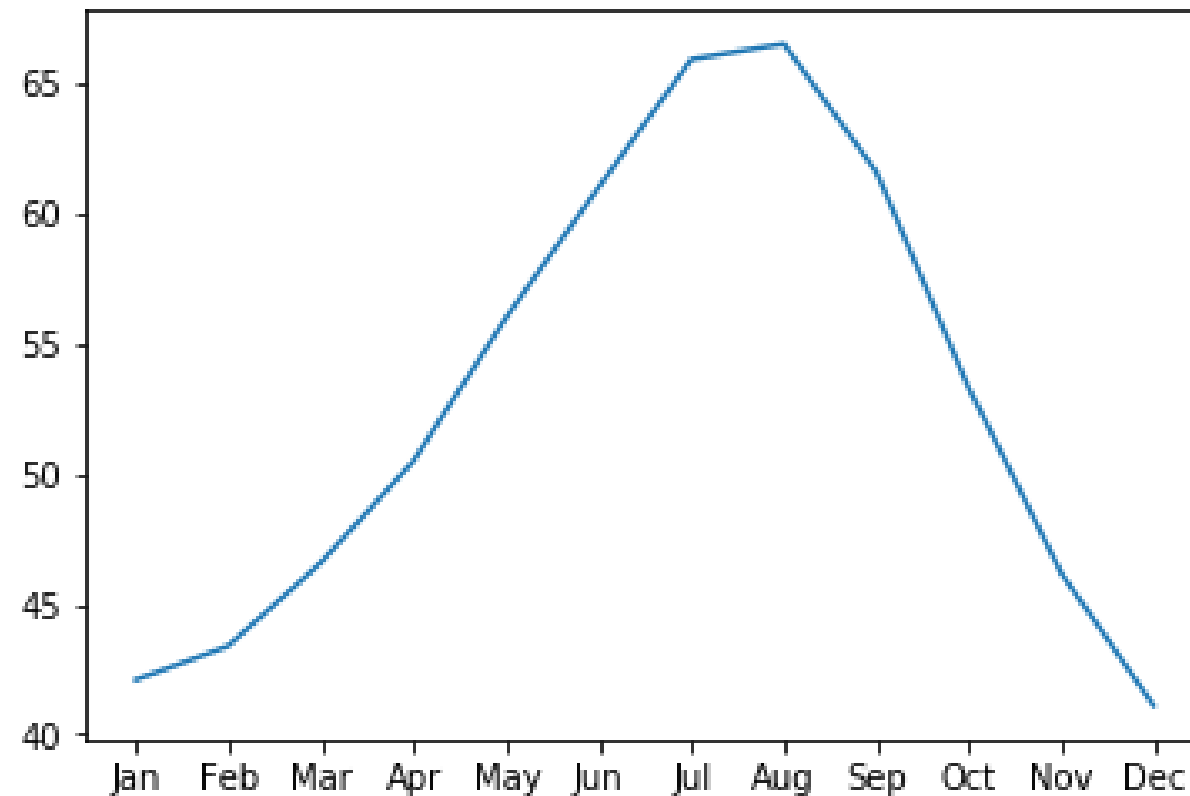
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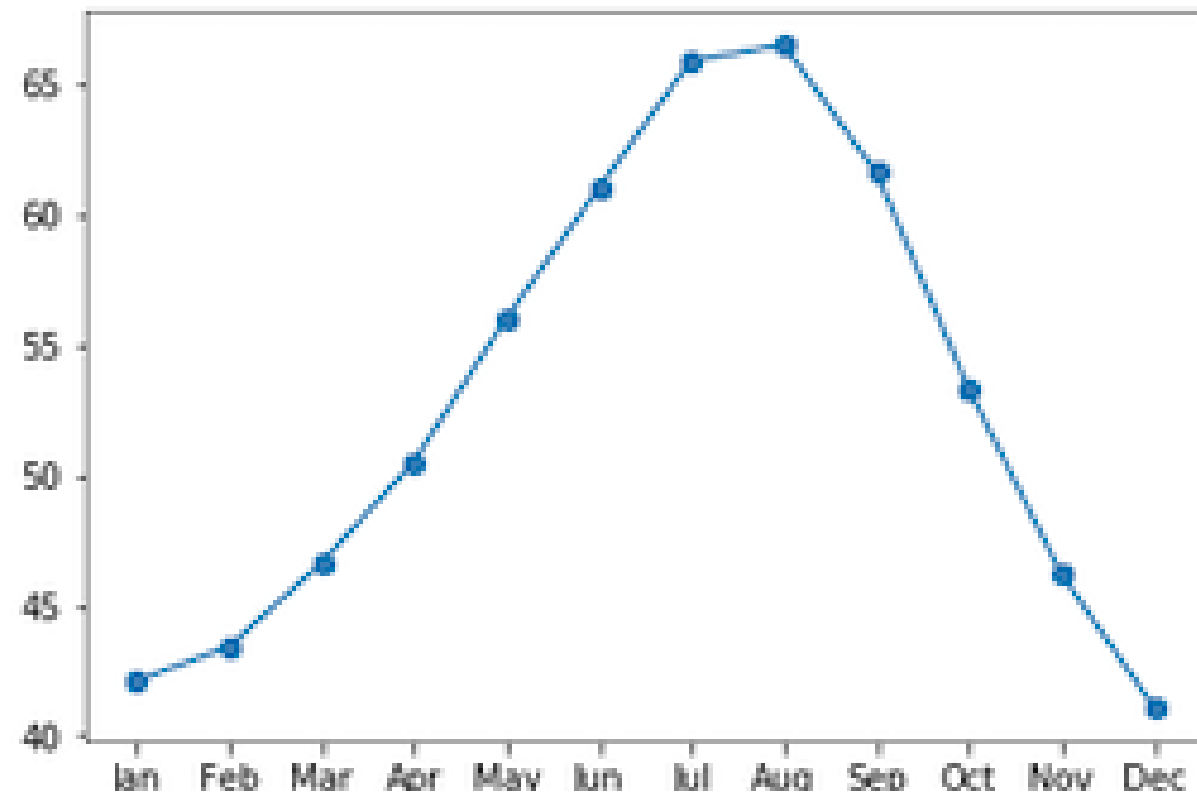
Customizing data appearance

```
ax.plot(seattle_weather["MONTH"],  
        seattle_weather["MLY-PRCP-NORMAL"])  
plt.show()
```



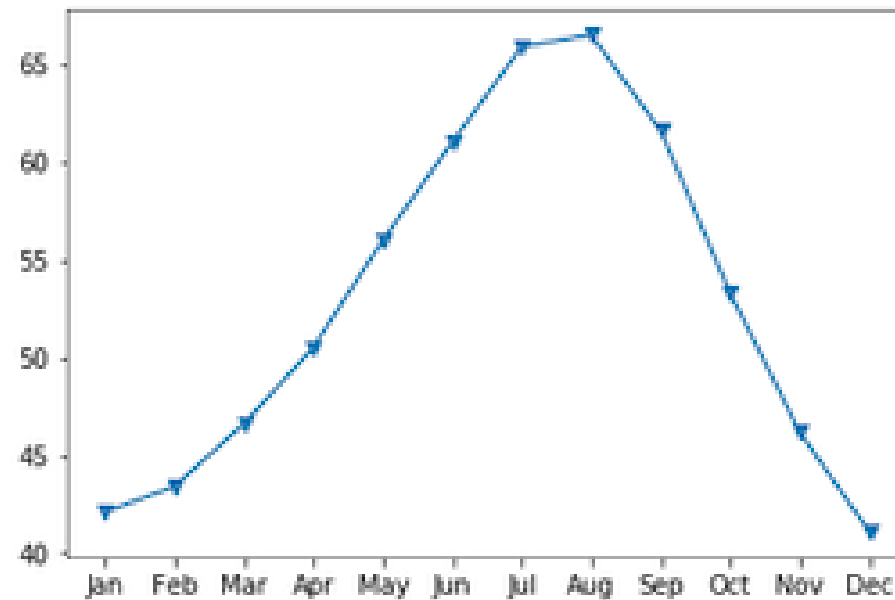
Adding markers

```
ax.plot(seattle_weather["MONTH"],  
        seattle_weather["MLY-PRCP-NORMAL"],  
        marker="o")  add markers to the plot  
plt.show()
```



Choosing markers

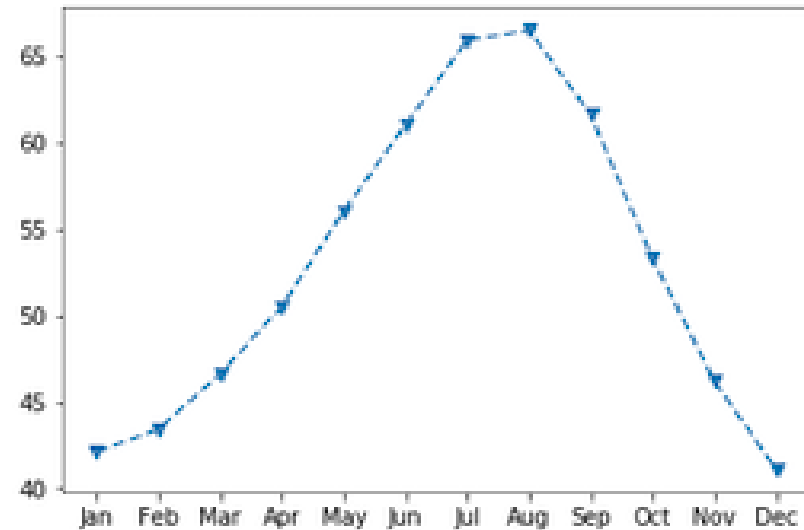
```
ax.plot(seattle_weather["MONTH"],  
        seattle_weather["MLY-PRCP-NORMAL"],  
        marker="v")  
plt.show()
```



https://matplotlib.org/api/markers_api.html

Setting the linestyle

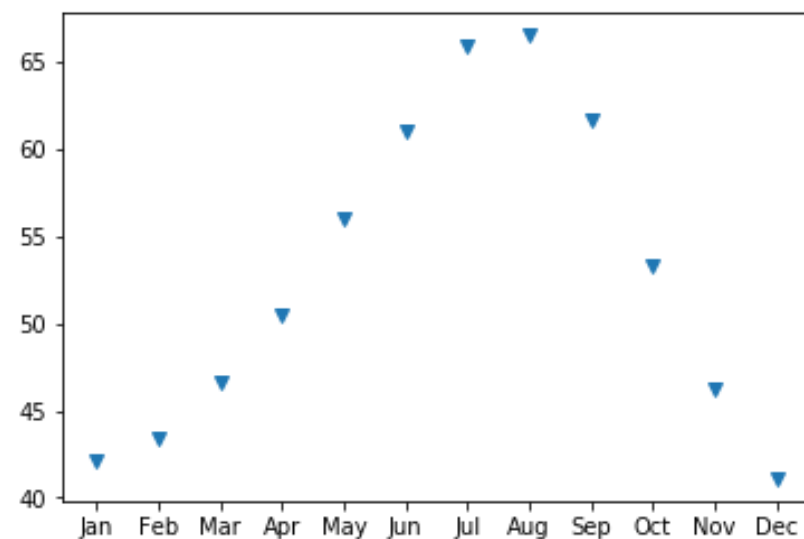
```
fig, ax = plt.subplots()
ax.plot(seattle_weather["MONTH"],
        seattle_weather["MLY-TAVG-NORMAL"],
        marker="v", linestyle="--")
plt.show()
```



https://matplotlib.org/gallery/lines_bars_and_markers/line_styles_reference.html

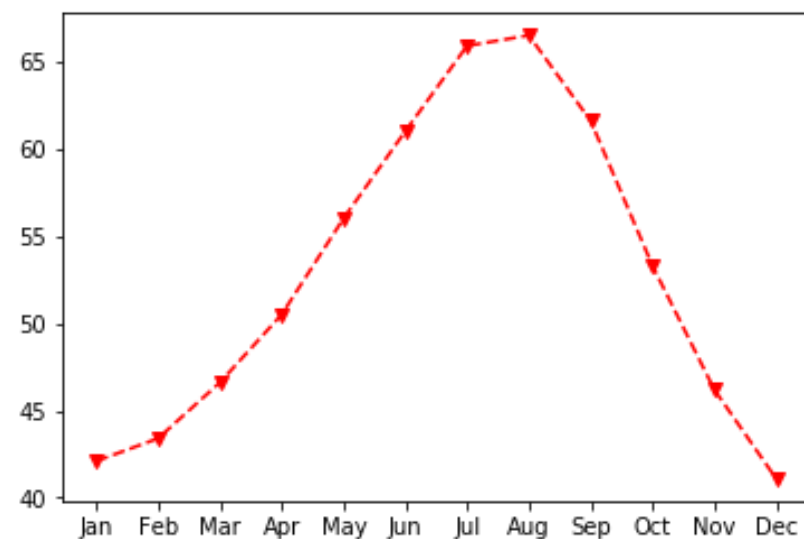
Eliminating lines with linestyle

```
fig, ax = plt.subplots()
ax.plot(seattle_weather["MONTH"],
        seattle_weather["MLY-TAVG-NORMAL"],
        marker="v", linestyle="None")
plt.show()
```



Choosing color

```
fig, ax = plt.subplots()
ax.plot(seattle_weather["MONTH"],
        seattle_weather["MLY-TAVG-NORMAL"],
        marker="v", linestyle="--", color="r")
plt.show()
```

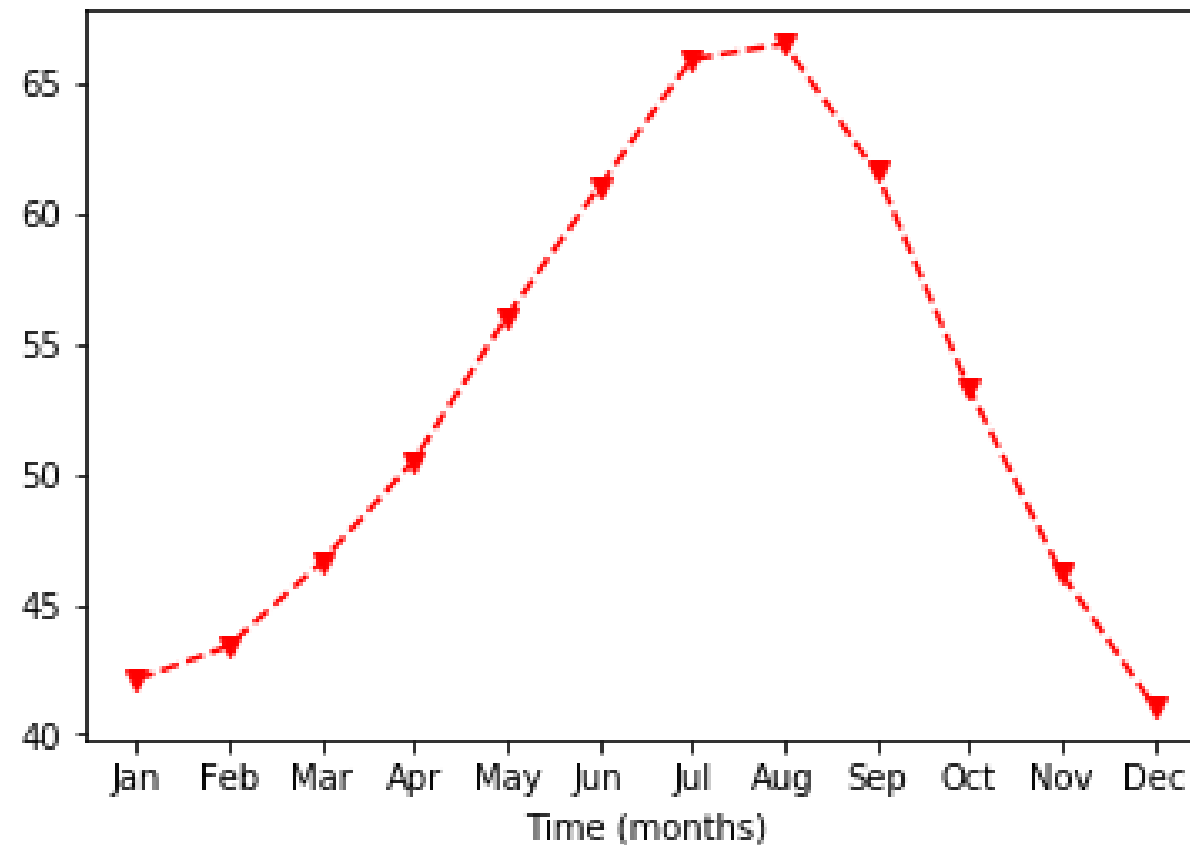


Customizing the axes labels

```
ax.set_xlabel("Time (months)")
```

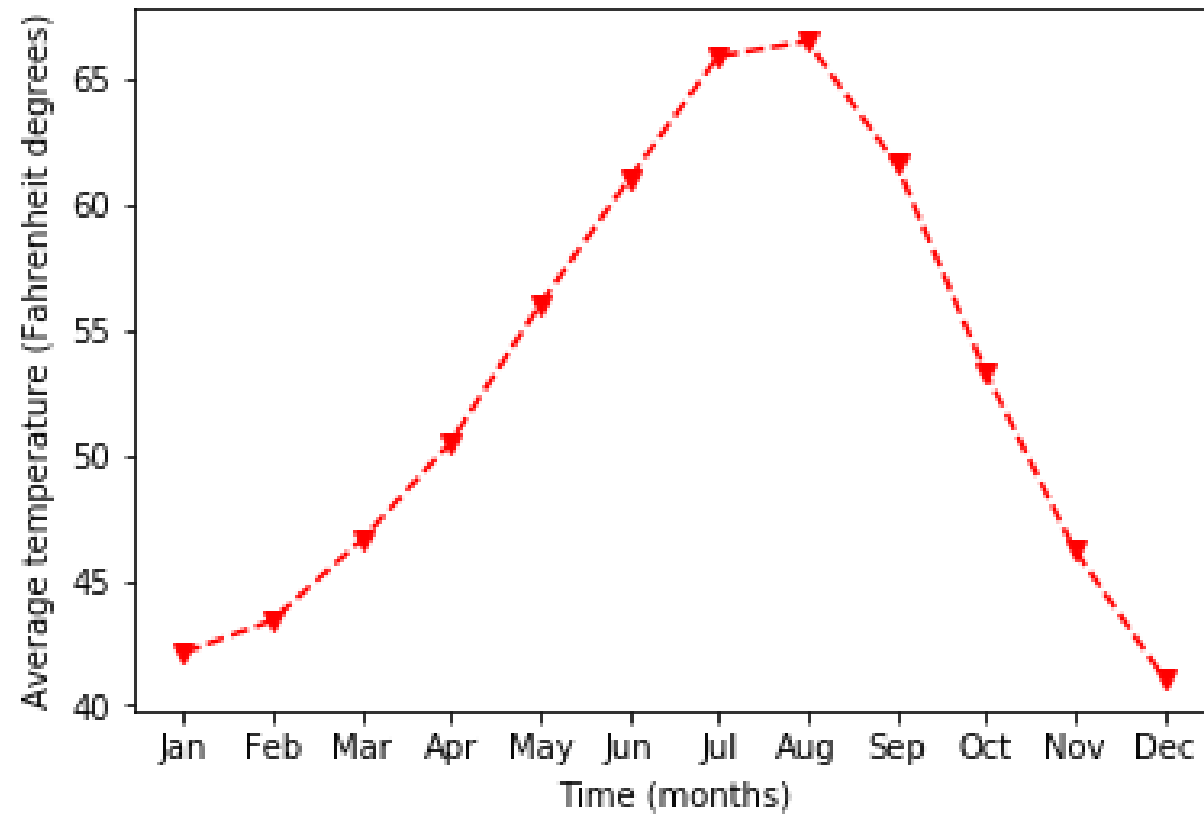
```
plt.show()
```

These are methods that you can use to change certain properties of the object, before calling show to display it.



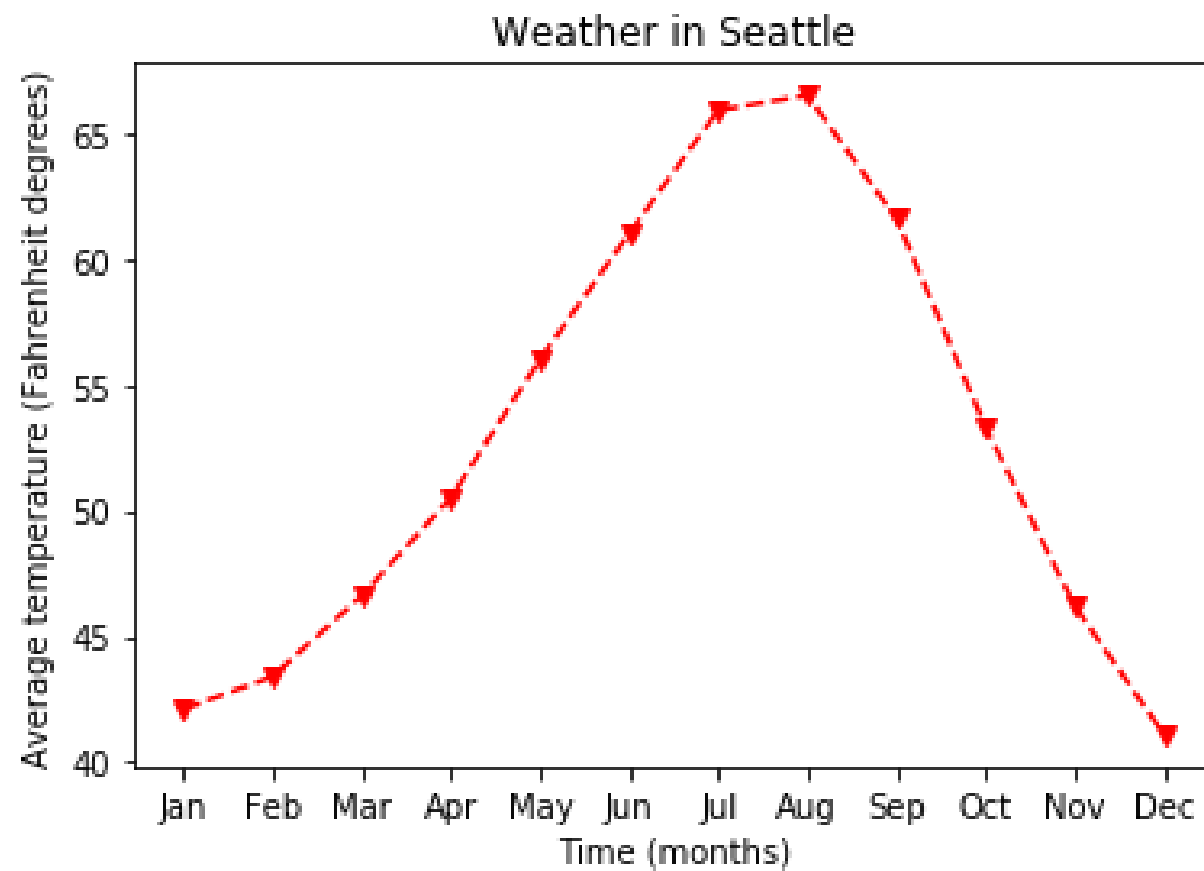
Setting the y axis label

```
ax.set_xlabel("Time (months)")  
ax.set_ylabel("Average temperature (Fahrenheit degrees)")  
plt.show()
```



Adding a title

```
ax.set_title("Weather in Seattle")  
plt.show()
```



Practice customizing your plots!

INTRODUCTION TO DATA VISUALIZATION WITH MATPLOTLIB

Small multiples

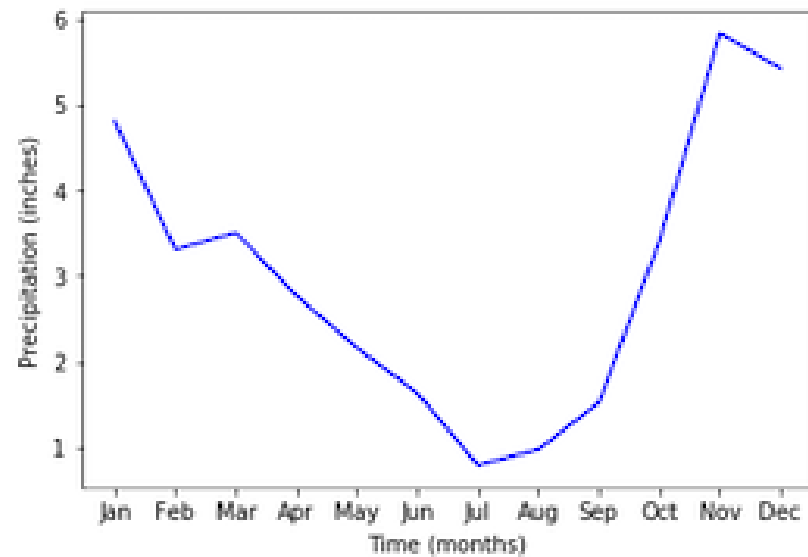
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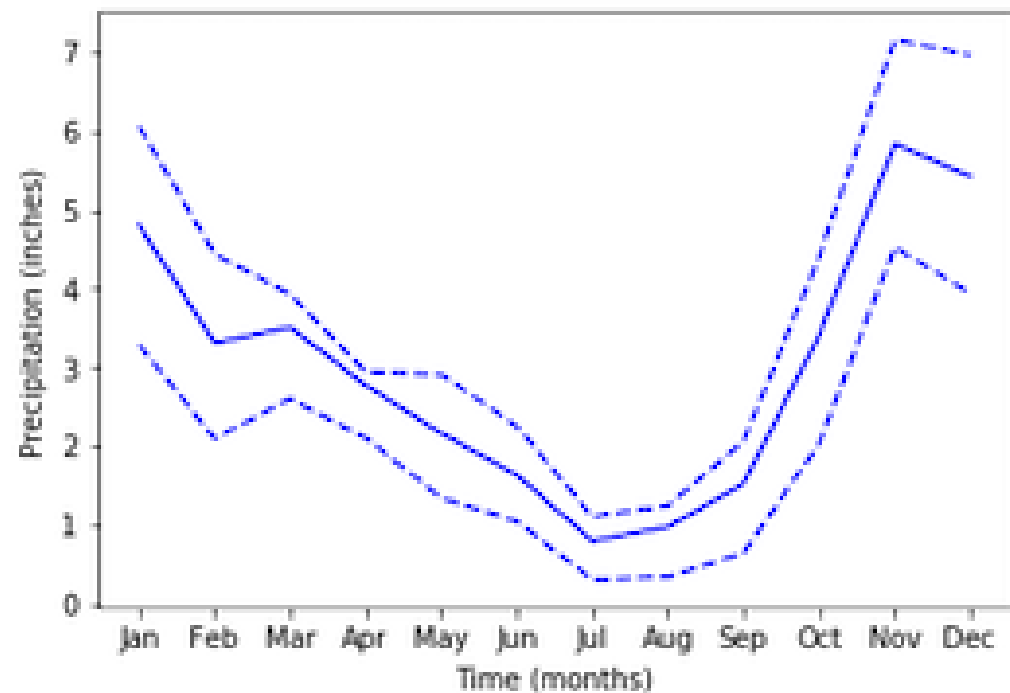
Adding data

```
ax.plot(seattle_weather["MONTH"],  
        seattle_weather["MLY-PRCP-NORMAL"],  
        color='b')  
ax.set_xlabel("Time (months)")  
ax.set_ylabel("Precipitation (inches)")  
plt.show()
```



Adding more data

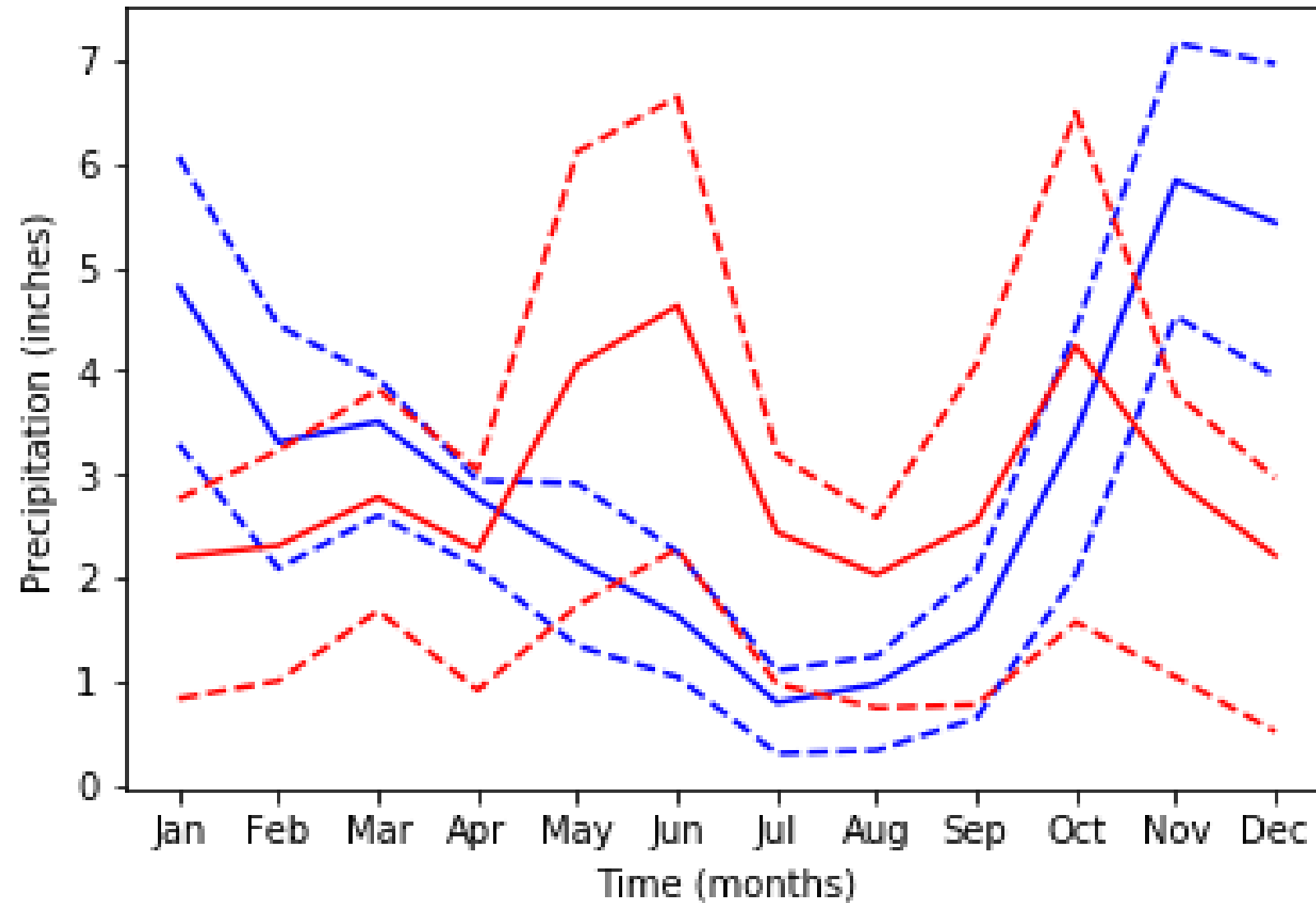
```
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-25PCTL"],  
        linestyle='--', color='b')  
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-75PCTL"],  
        linestyle='--', color='b')  
plt.show()
```



And more data

```
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-NORMAL"],  
        color='r')  
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-25PCTL"],  
        linestyle='--', color='r')  
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-75PCTL"],  
        linestyle='--', color='r')  
plt.show()
```

Too much data!

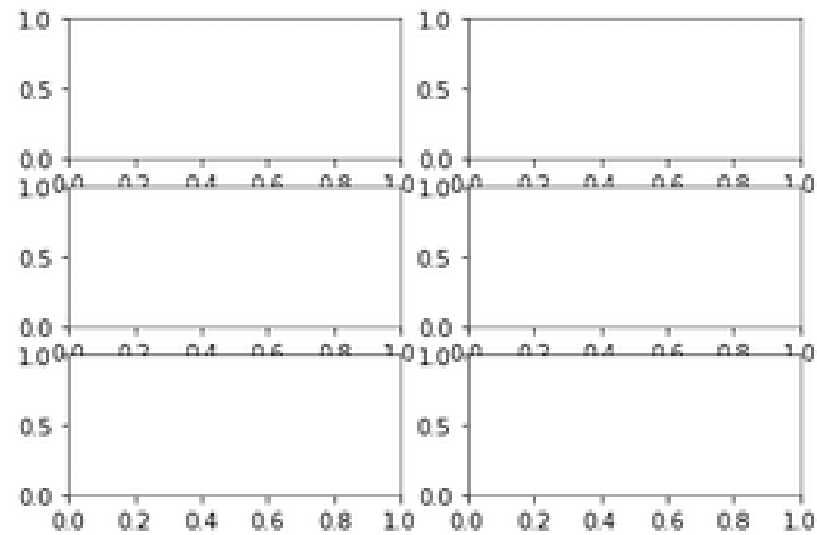


Small multiples with plt.subplots

```
fig, ax = plt.subplots()
```

```
fig, ax = plt.subplots(3, 2)
```

```
plt.show()
```



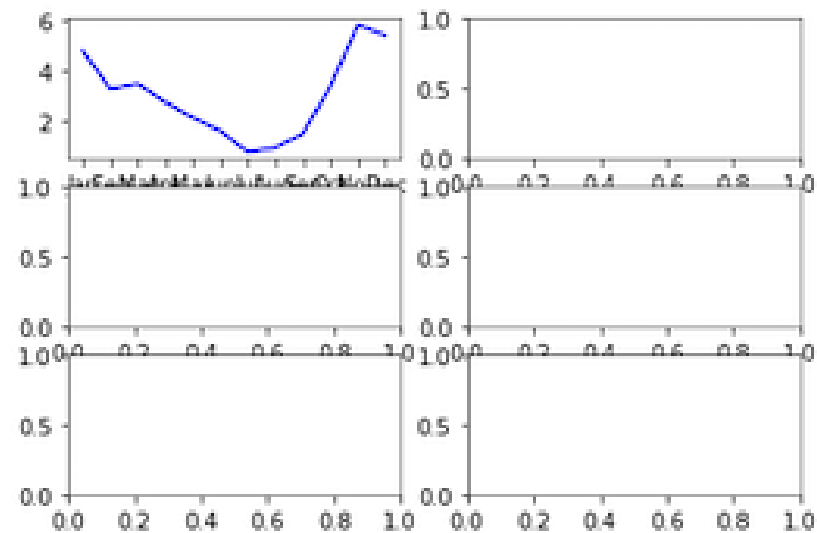
Adding data to subplots

```
ax.shape
```

```
(3, 2)
```

```
ax[0, 0].plot(seattle_weather["MONTH"],  
              seattle_weather["MLY-PRCP-NORMAL"],  
              color='b')
```

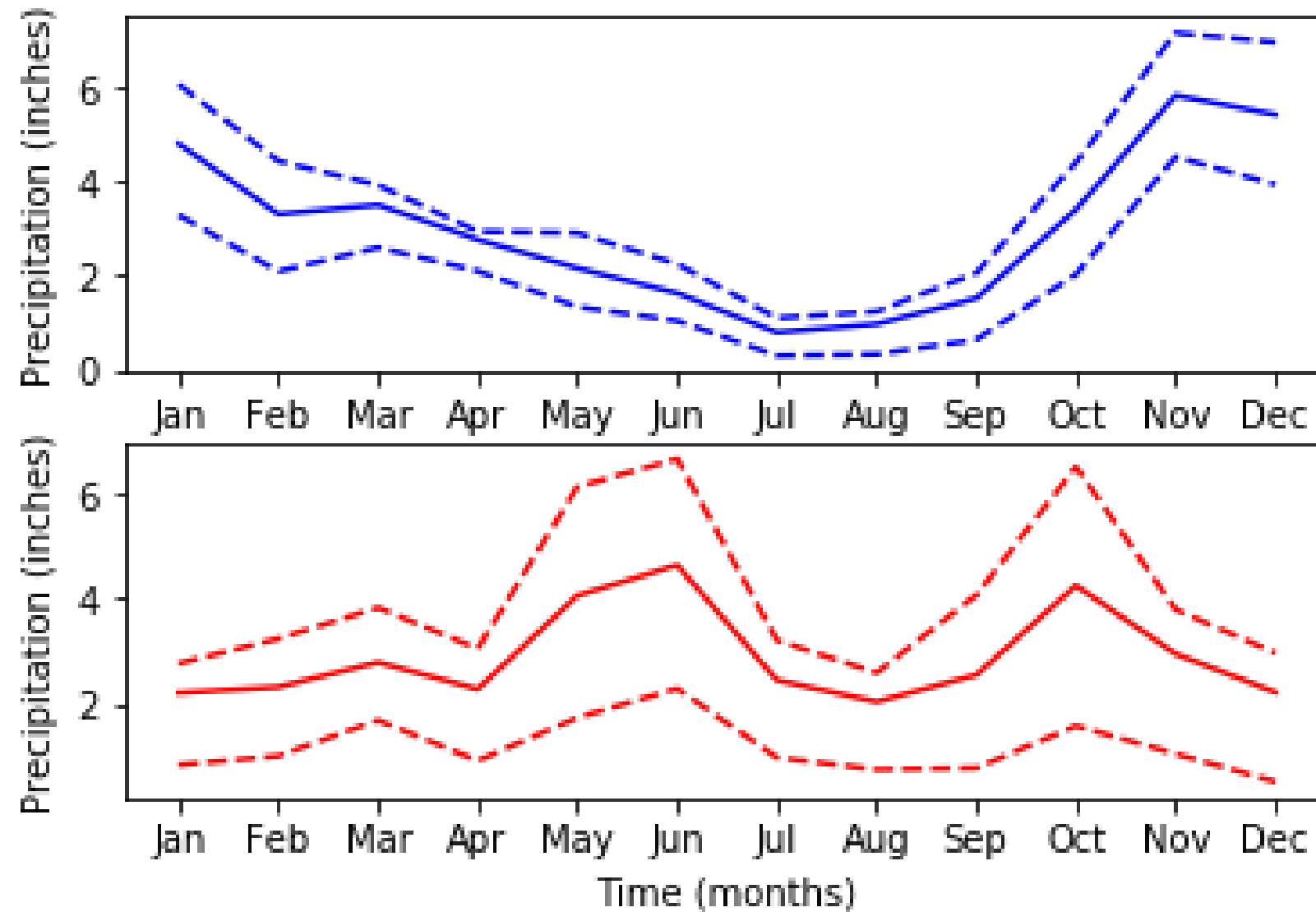
```
plt.show()
```



Subplots with data

```
fig, ax = plt.subplots(2, 1)
ax[0].plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-NORMAL"],
           color='b')
ax[0].plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-25PCTL"],
           linestyle='--', color='b')
ax[0].plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-75PCTL"],
           linestyle='--', color='b')
ax[1].plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-NORMAL"],
           color='r')
ax[1].plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-25PCTL"],
           linestyle='--', color='r')
ax[1].plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-75PCTL"],
           linestyle='--', color='r')
ax[0].set_ylabel("Precipitation (inches)")
ax[1].set_ylabel("Precipitation (inches)")
ax[1].set_xlabel("Time (months)")
plt.show()
```

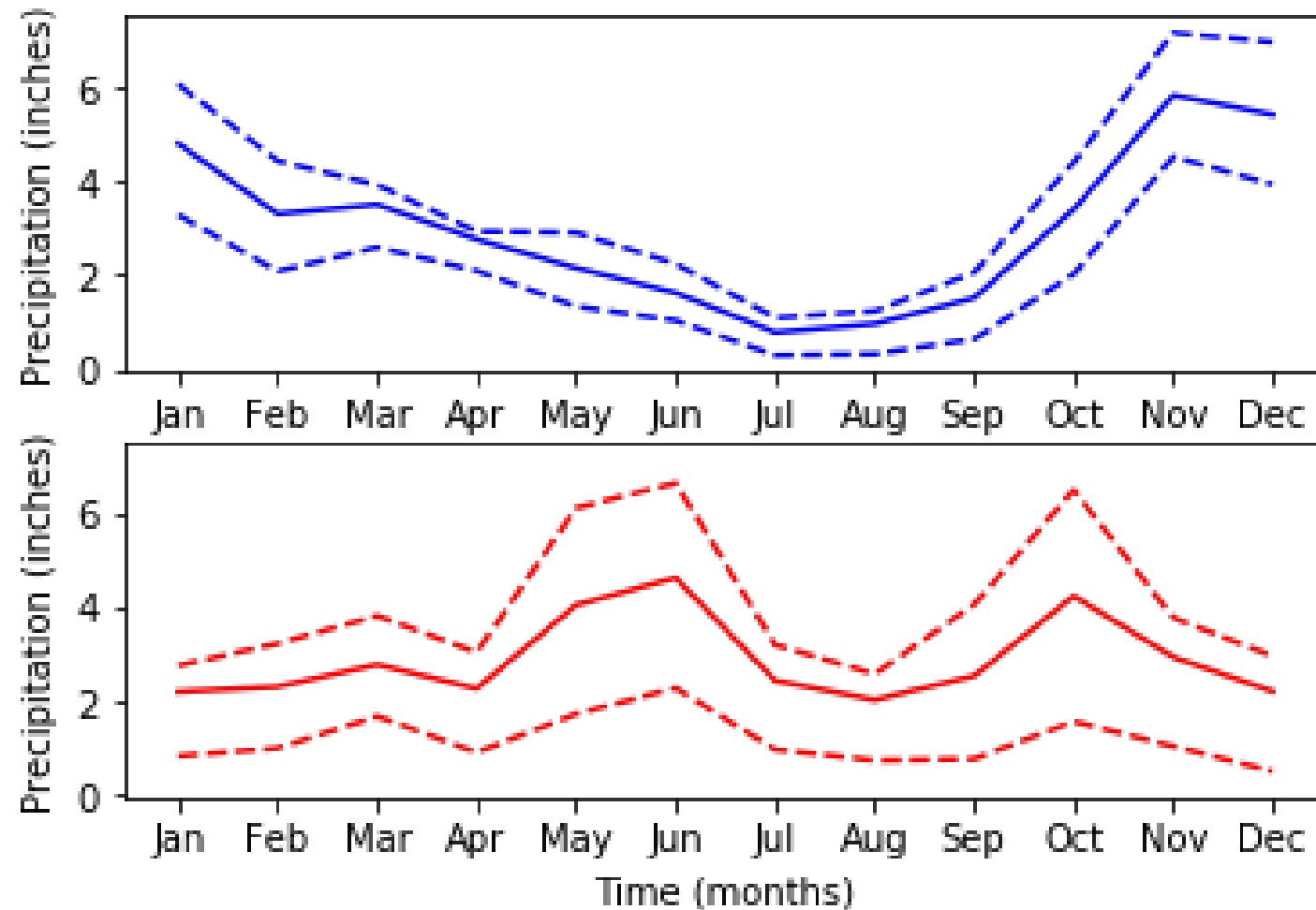
Subplots with data



Sharing the y-axis range

```
fig, ax = plt.subplots(2, 1, sharey=True)
```

the range of the y-axis in the two plots



Practice making subplots!

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