INTRODUCTION TO MATPLOTLIB

# Introduction to Data Visualization with Matplotlib

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# Data visualization

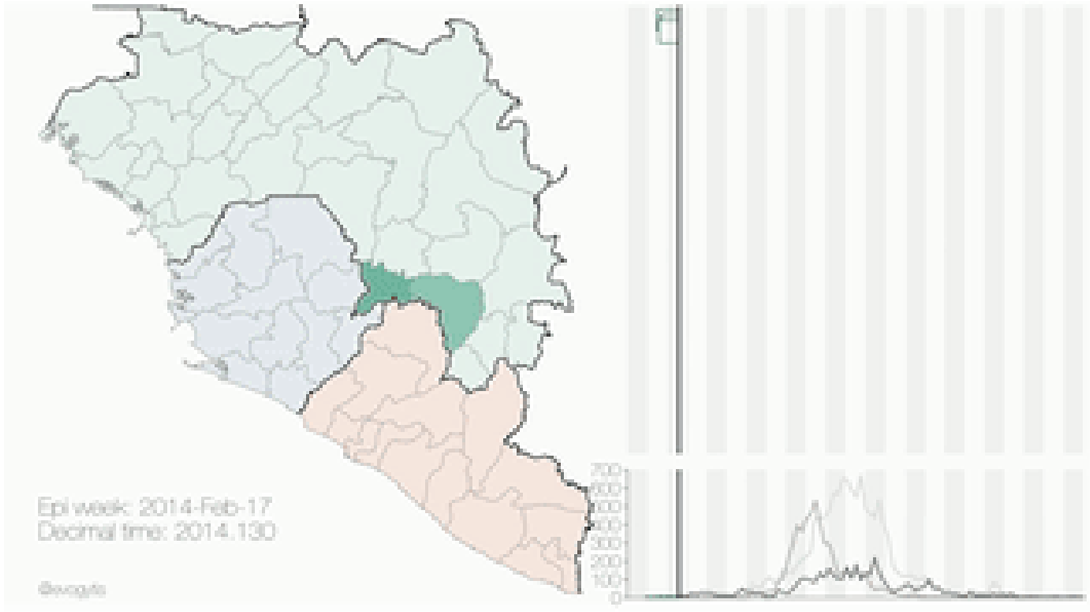
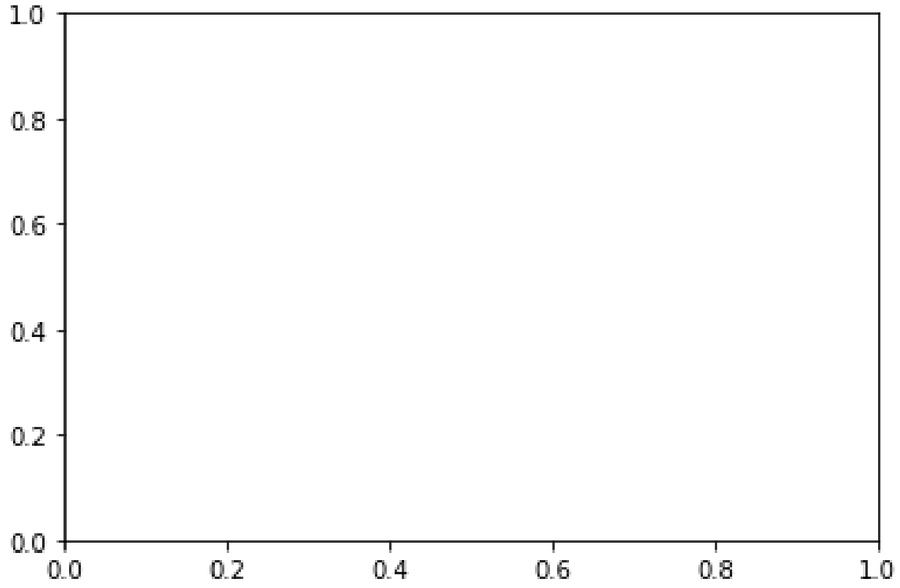



Image credit: Gytis Dudas and Andrew Rambaut

# Introducing the pyplot interface

```
import matplotlib.pyplot as plt

fig, ax = plt.subplots()

plt.show()
```



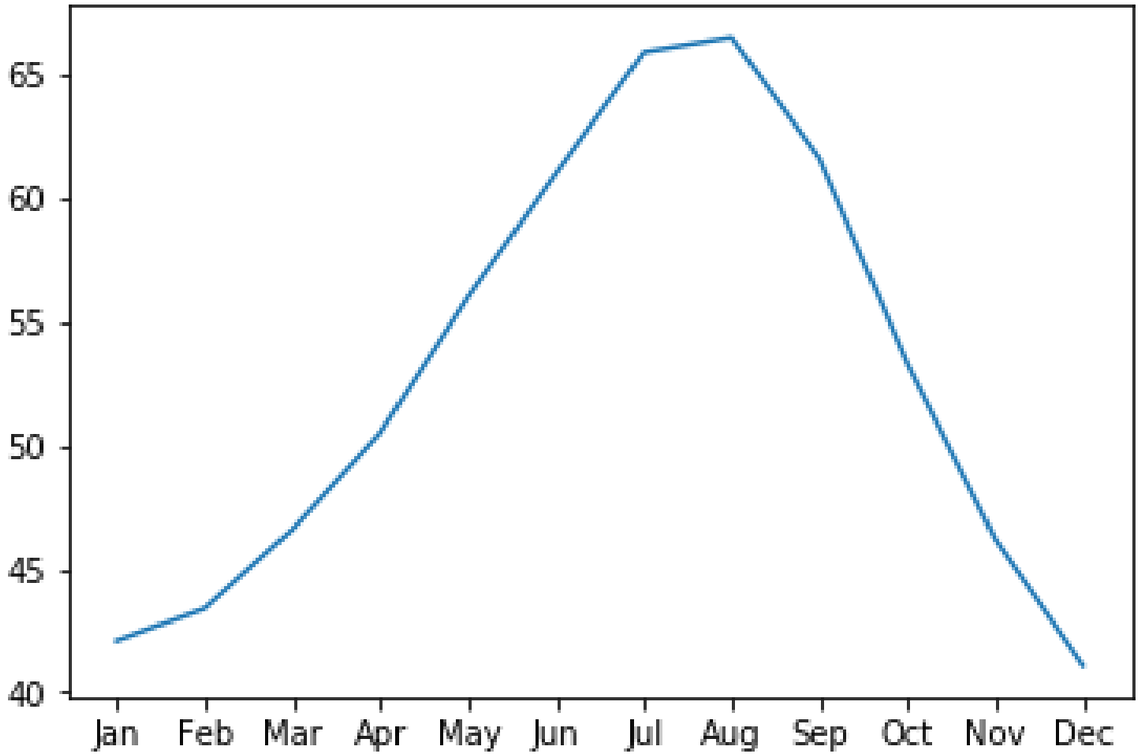
# Adding data to axes

```
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
```

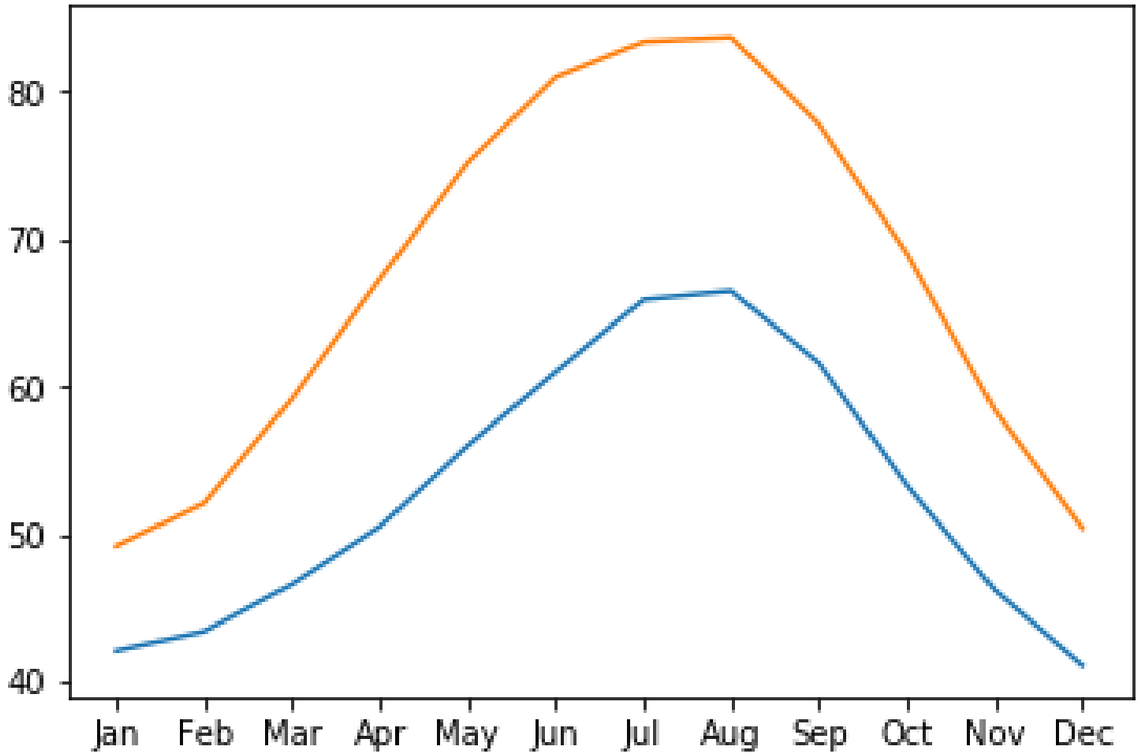
# Adding data to axes

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



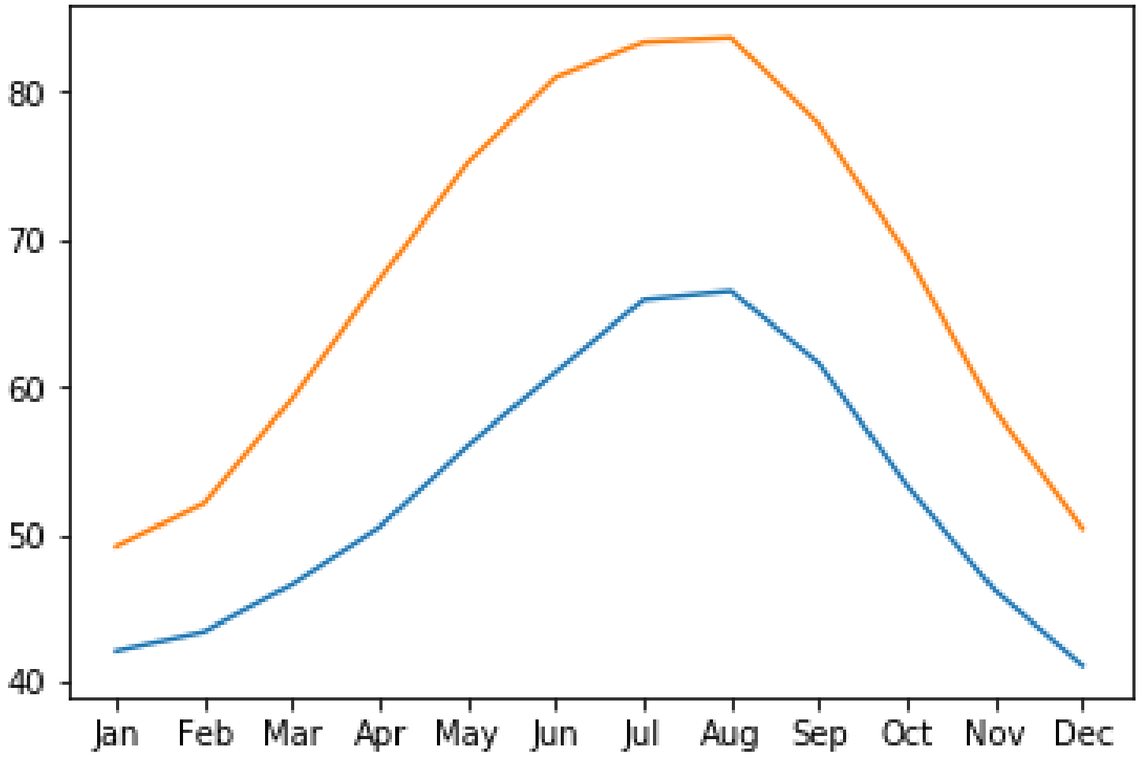
# Adding more data

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



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# Practice making a figure!

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# Customizing your plots

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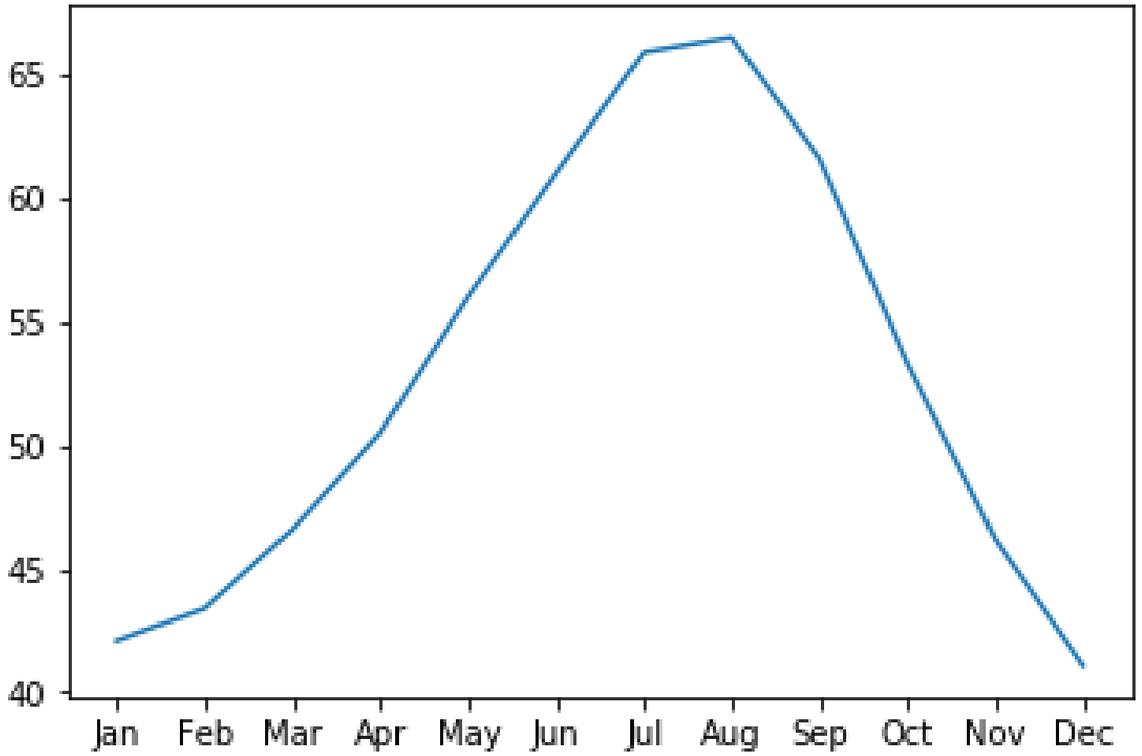
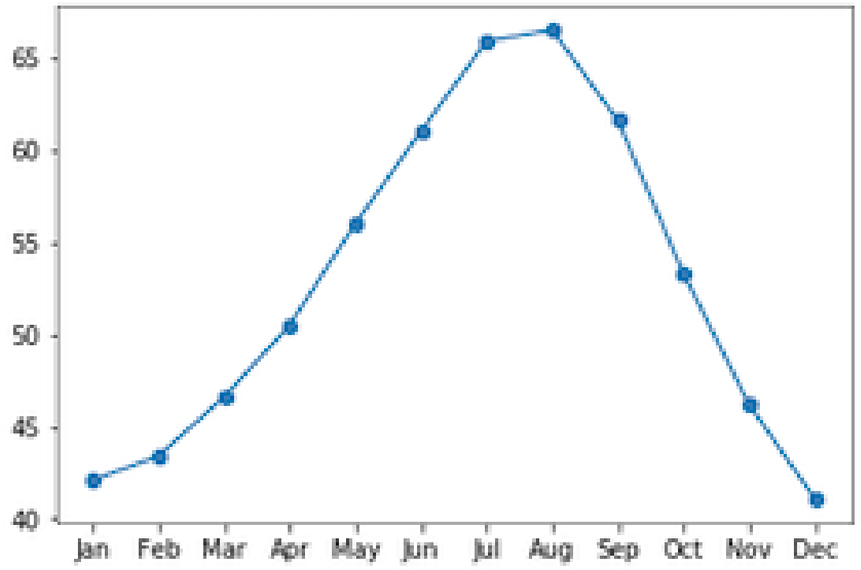
# Customizing data appearance

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



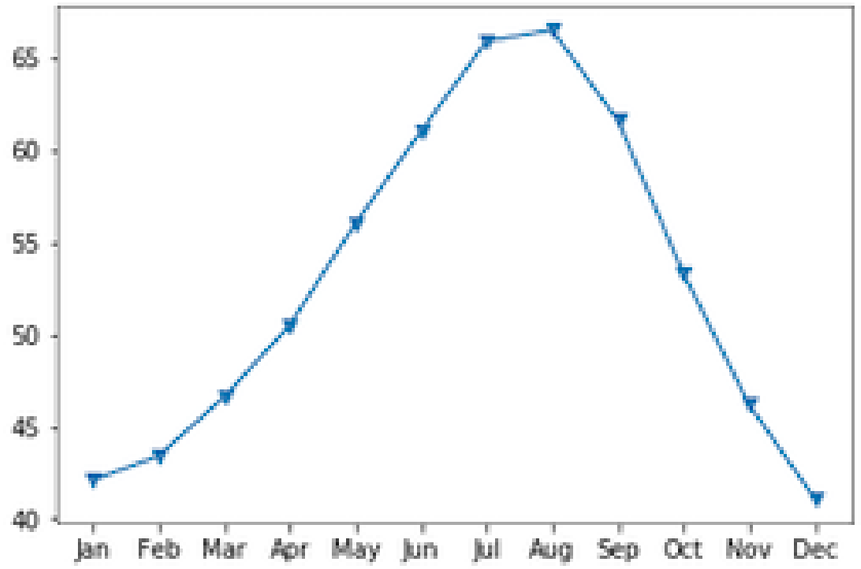
# Adding markers

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



# Choosing markers

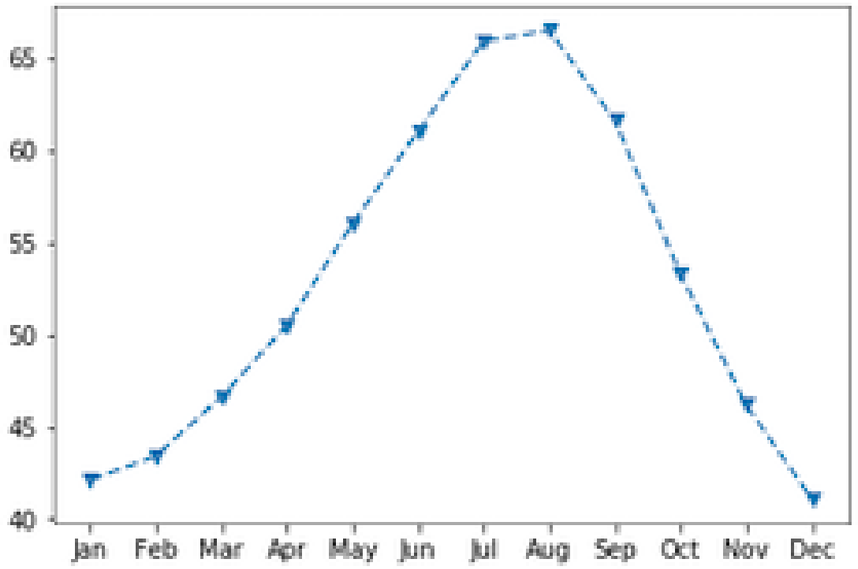
```
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-NORMAL"],
        marker="v")
plt.show()
```




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

# Setting the linestyle

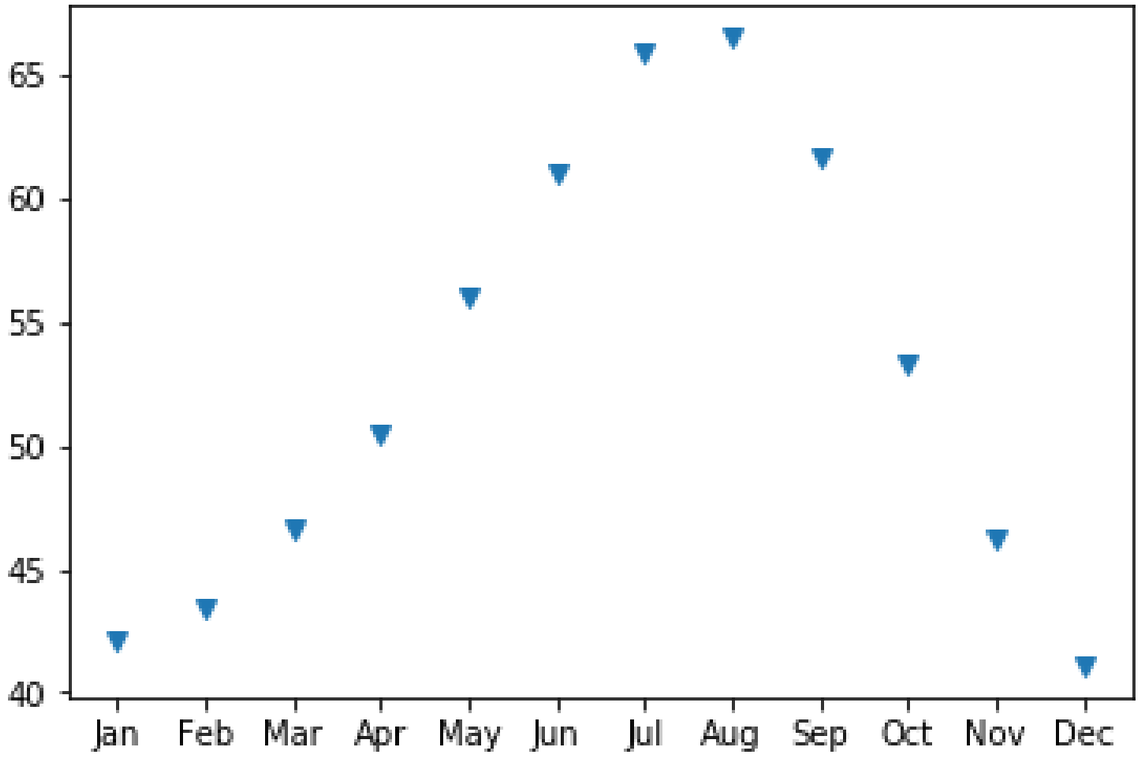
```
fig, ax = plt.subplots()
ax.plot(seattle_weather["MONTH"], seattle_weather["MLY-TAVG-NORMAL"],
        marker="v", linestyle="--")
plt.show()
```




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

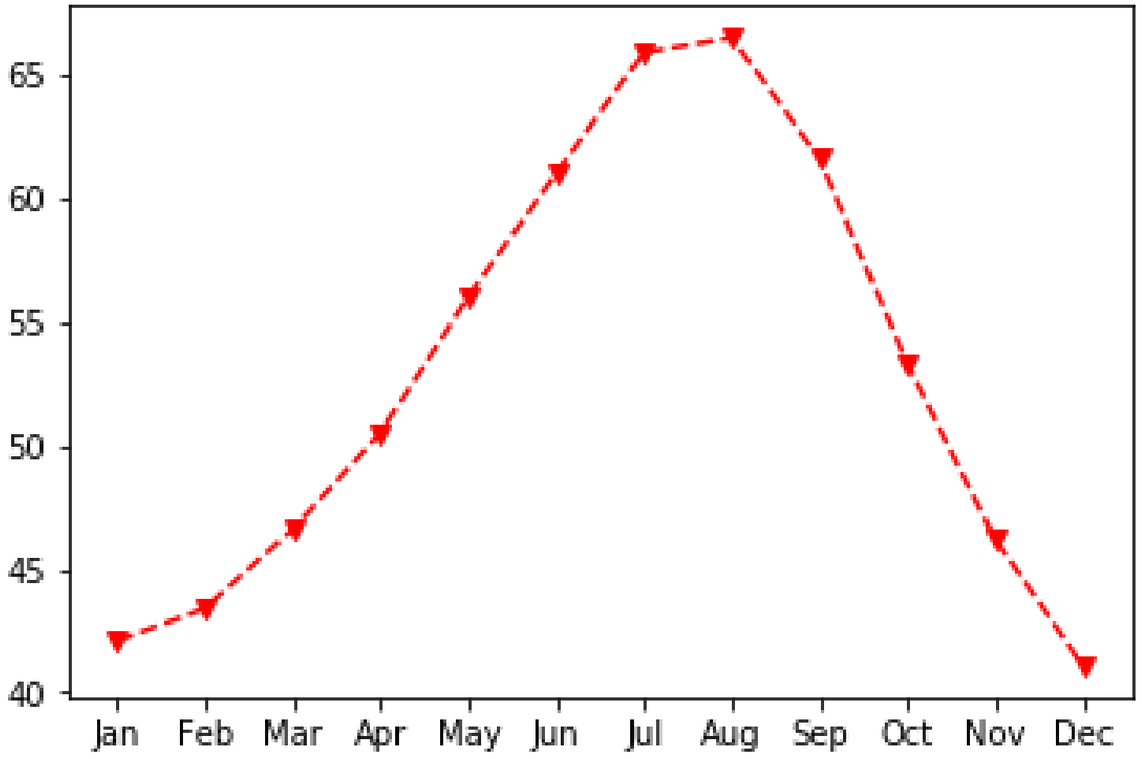
# Eliminating lines with linestyle

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



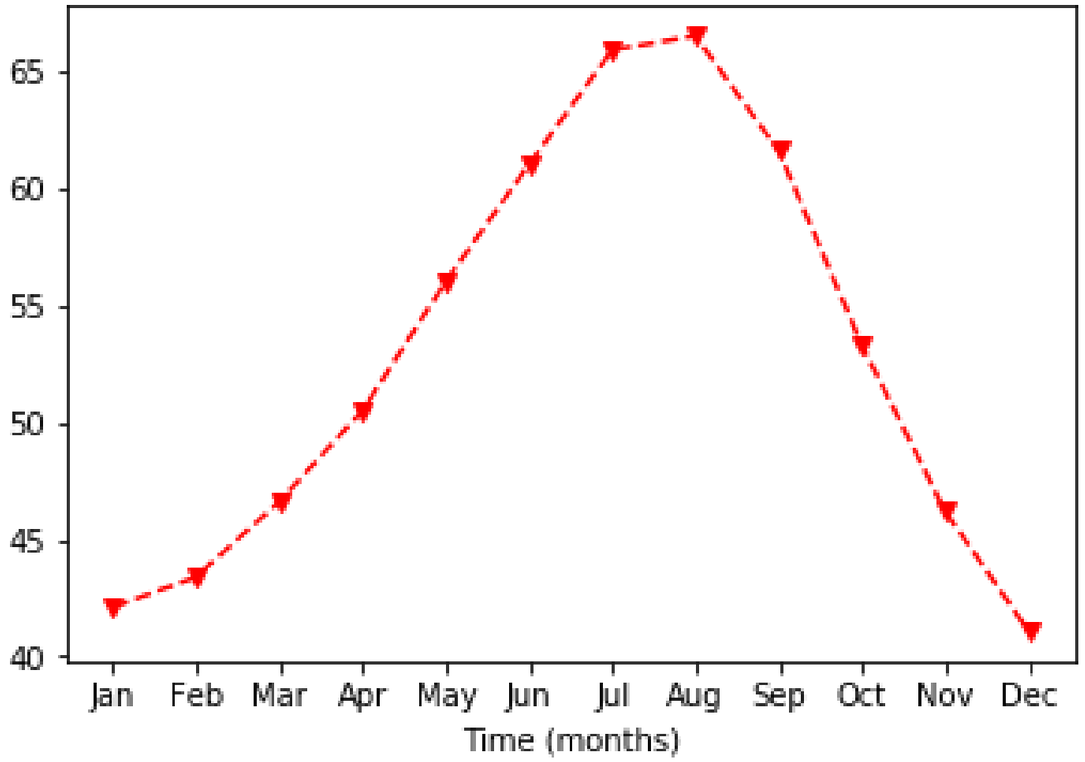
# Choosing color

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



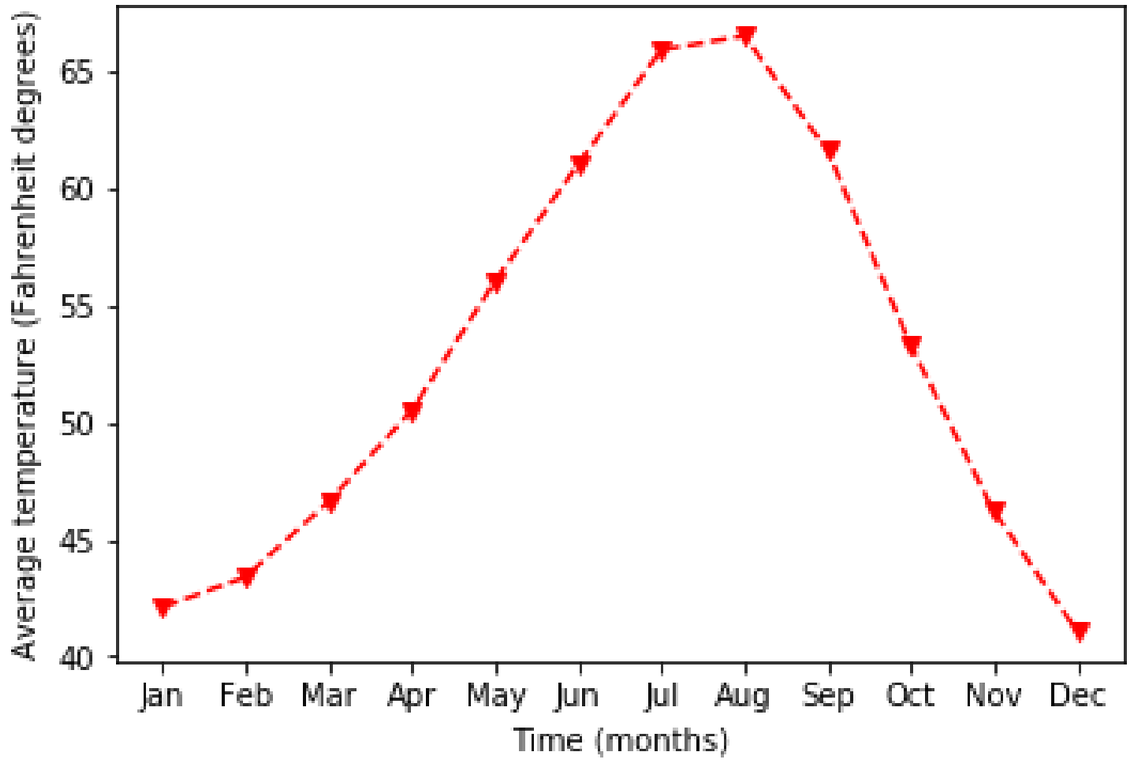
# Customizing the axes labels

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



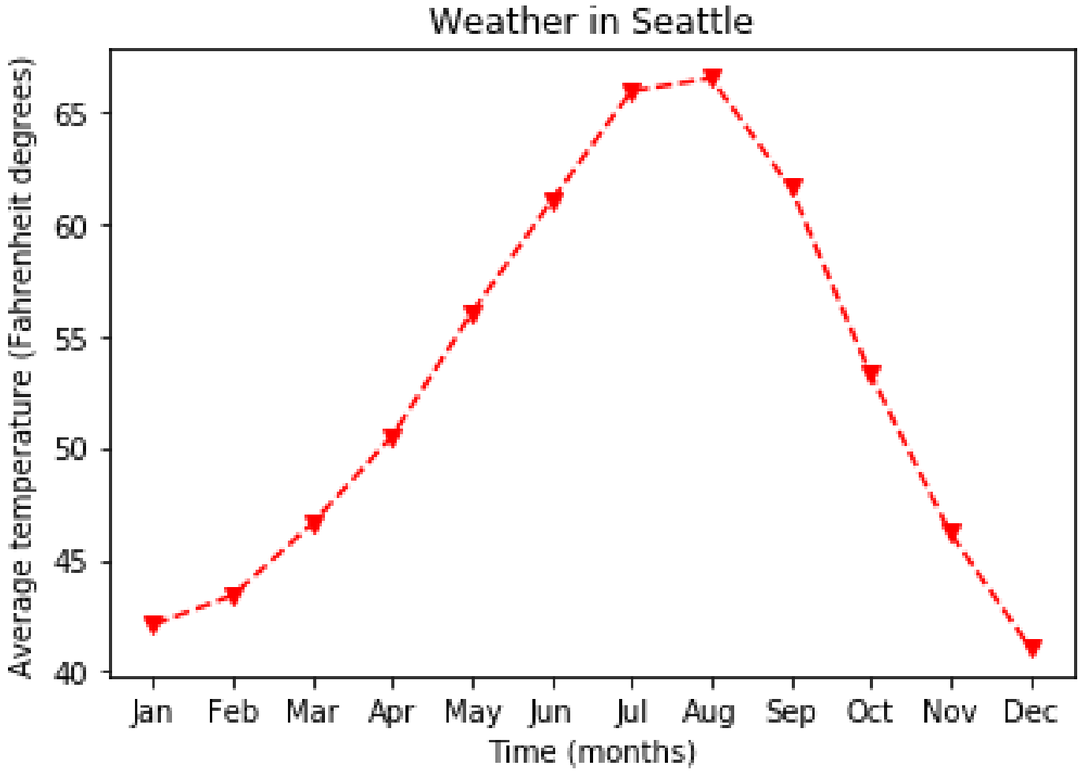
# Setting the y axis label

```
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()
```



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# Practice customizing your plots!

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# Small multiples

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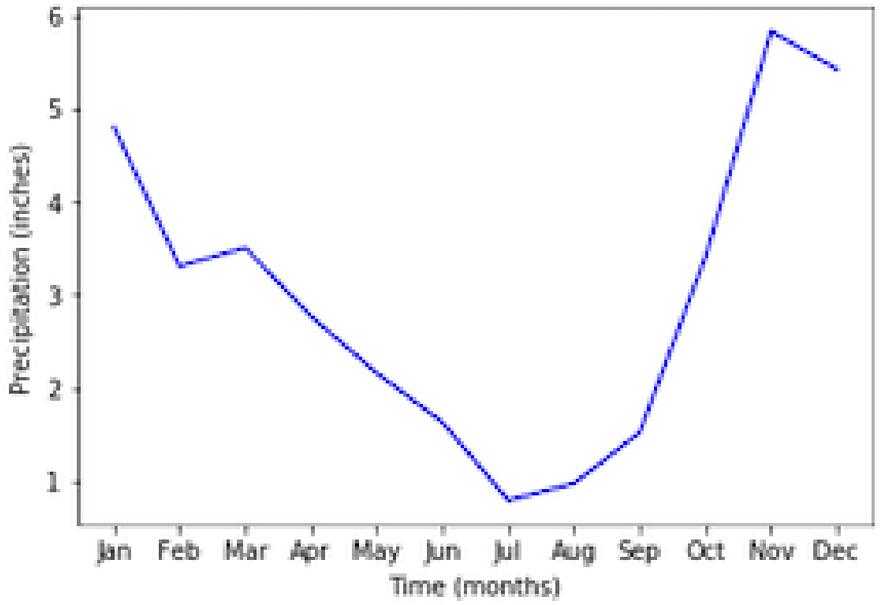
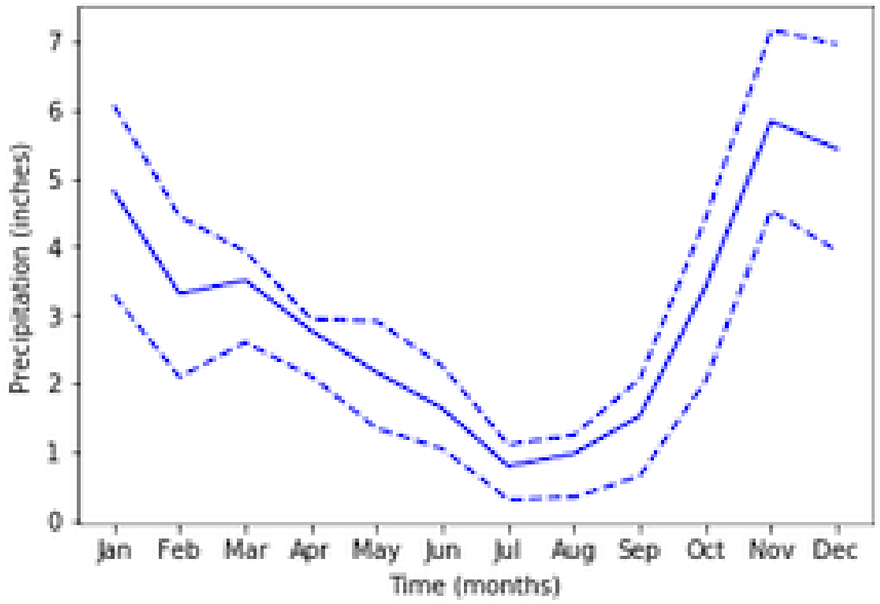
# Adding data

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



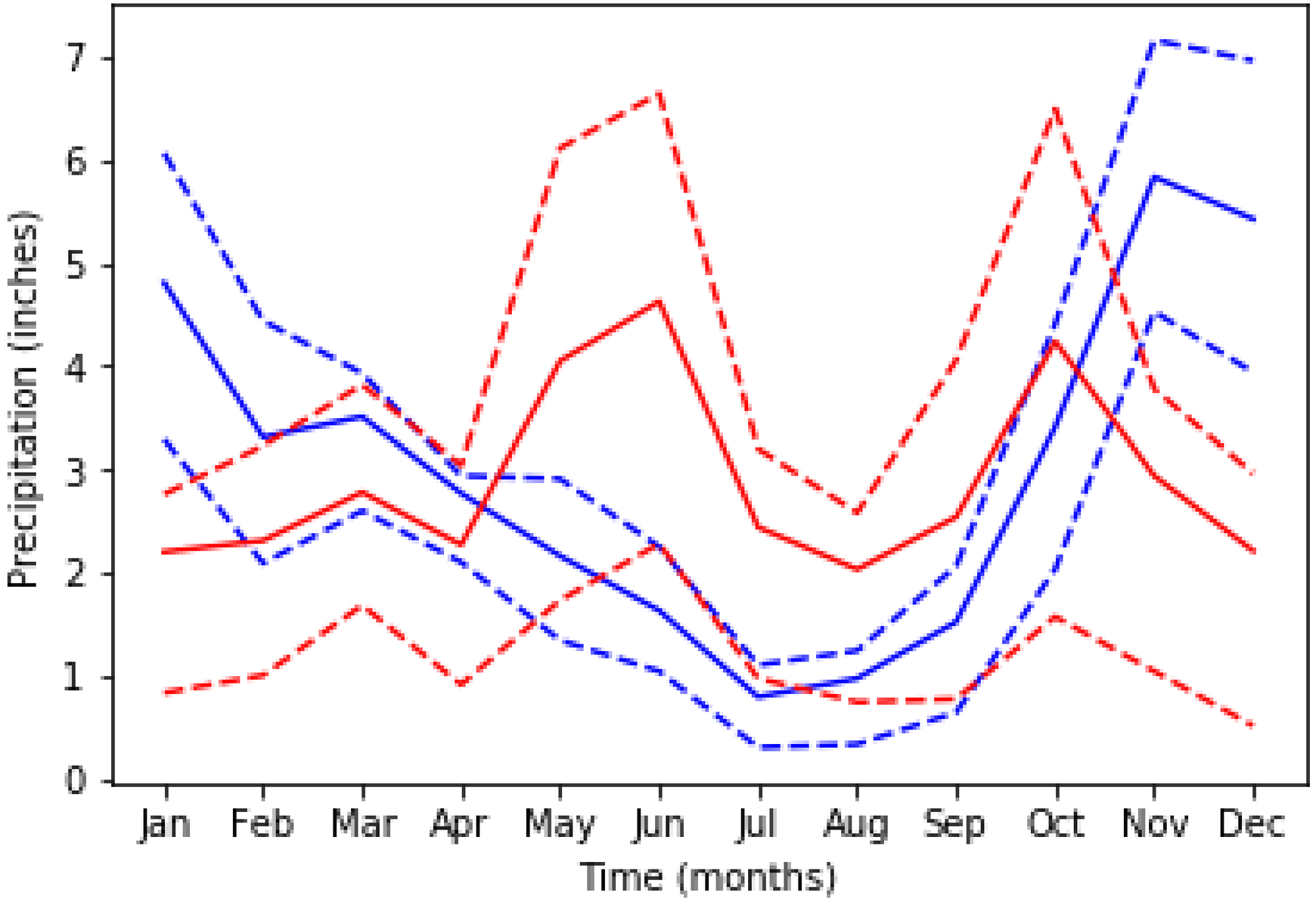
# Adding more data

```
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=color)
plt.show()
```



# And more data

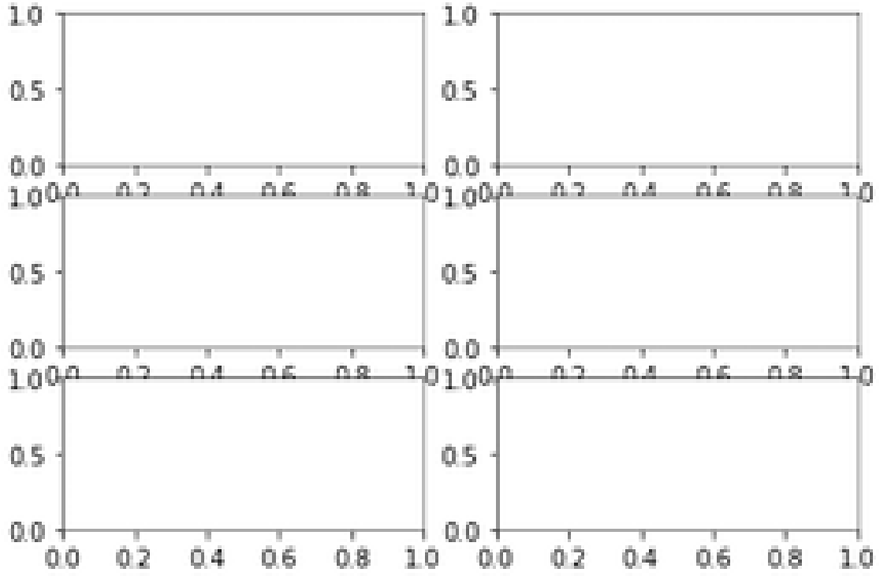
```
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-NORMAL"],
        color='r')
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-25PCTL"],
        linestyle='--', color='r')
ax.plot(austin_weather["MONTH"], austin_weather["MLY-PRCP-75PCTL"],
        linestyle='--', color='r')
plt.show()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


Precipitation (inches)
0
1
2
3
4
5
6
7
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time (months)

# Small multiples with plt.subplots

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

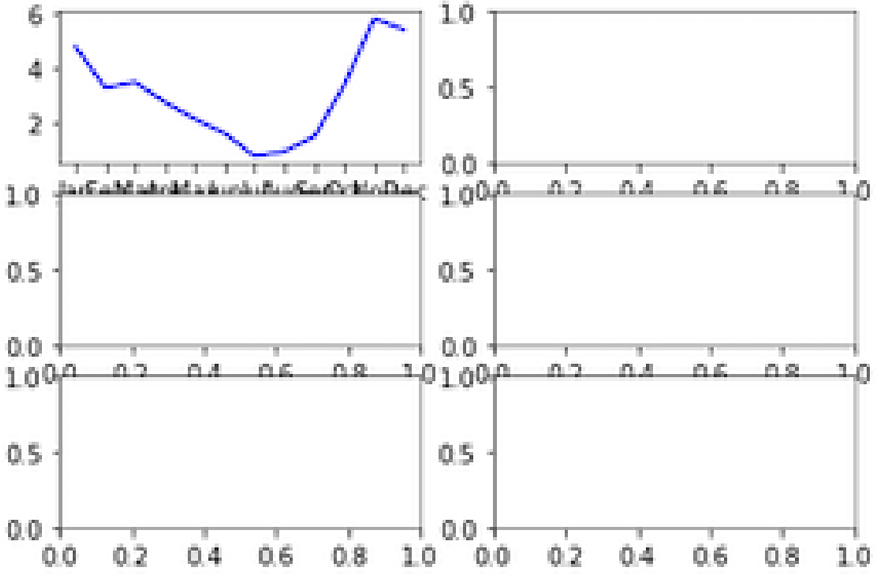
```
fig, ax = plt.subplots(3, 2)

plt.show()
```



# Adding data to subplots

```
ax.shape

(3, 2)
```

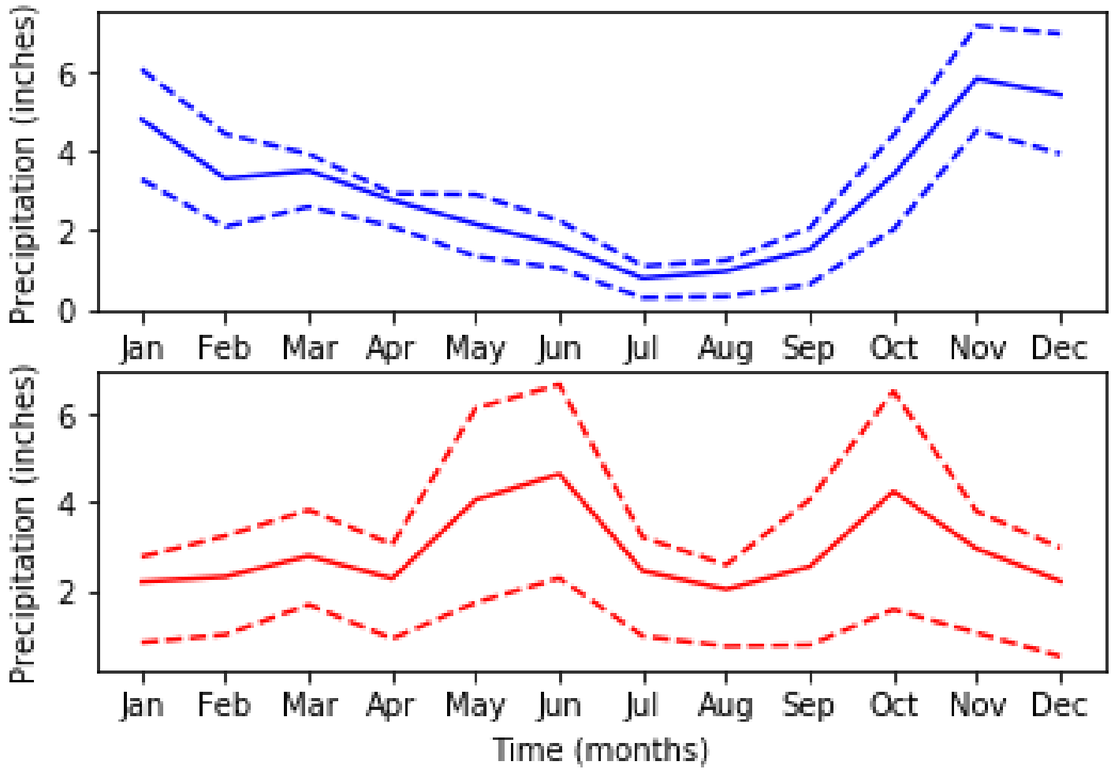
```
ax[0, 0].plot(seattle_weather["MONTH"], seattle_weather["MLY-PRCP-NORMAL"],
        color='b')

plt.show()
```



# Subplots with data

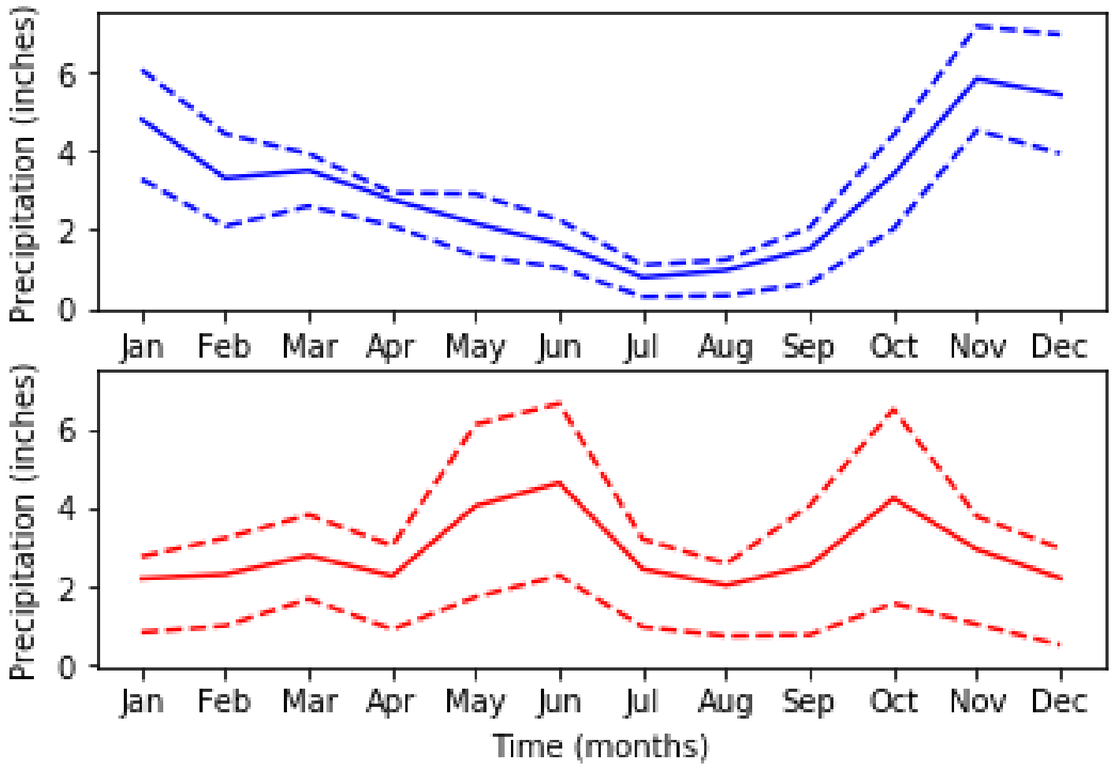
```
fig, ax = plt.subplots(2, 1)

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



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# Practice making subplots!