```
# WeatherPy
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#### Note
* Instructions have been included for each segment. You do not have to
follow them exactly, but they are included to help you think through the
steps.

* Observed Trend 1: Temperature is higher in the Equatorial region
* Observed Trend 2: Percentage of cloud cover is higher in the higher
further away from the Equator
* Observed Trend 3: Maximum Wind Speed is higher in the Equatorial region
```

In [ ]:

In [1]:

```
# Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import requests
import time
import openweathermapy.core as owm
from datetime import date

# Import API key
from api_keys import api_key

# Incorporated citipy to determine city based on latitude and longitude
from citipy import citipy

# Output File (CSV)
output_data_file = "output_data/cities.csv"

# Range of latitudes and longitudes
lat_range = (-180, 180)
lng_range = (-360, 360)

today = date.today()
```

Generate Cities List

In [2]:

```
# List for holding lat_lngs and cities
lat_lngs = []
cities = []

# Create a set of random lat and lng combinations
lats = np.random.uniform(low=-180.000, high=180.000, size=6000)
lngs = np.random.uniform(low=-360.000, high=360.000, size=6000)
lat_lngs = zip(lats, lngs)

# Identify nearest city for each lat, lng combination
for lat_lng in lat_lngs:
    city = citipy.nearest_city(lat_lng[0], lat_lng[1]).city_name
    
    # If the city is unique, then add it to a our cities list
    if city not in cities:
        cities.append(city)

# Print the city count to confirm sufficient count
len(cities)
```

Out[2]:

```
607
```

In [ ]:

Perform API Calls

- Perform a weather check on each city using a series of successive API calls.
- Include a print log of each city as it'sbeing processed (with the city number and city name).

In [3]:

```
settings = {"APPID": api_key, "units": "imperial", "lang": "EN"}
keys = ["clouds.all", "sys.country", "dt", "main.humidity", "coord.lat", "c
df = pd.DataFrame(columns=['City','Cloudiness', 'Country', 'Date', 'Humidit

# Write a logfile of each city as it is being processed with the city name
logfile = open("output_data/cities.log", "w")

print("Beginning Data Retrieval")
print("-----------------------------")

i = 0
setCnt = 1

for city in cities:

    i = i + 1

    print(f"Processing Record {i} of Set {setCnt} | {city}")

    try:
        data = owm.get_current(city, **settings)
        df = df.append({'City':city, 'Cloudiness':data('clouds.all'), 'Coun
                        'Humidity':data('main.humidity'),'Lat':data('coord.
                        'Max Temp': data("main.temp_max"),'Wind Speed': dat
        logfile.write(f"{city},{data('id')}\n")
    except:
        print("City not found. Skipping...")

    if i == 25:
        print('Sleeping...')
        time.sleep(40)
        i = 0
        setCnt = setCnt + 1

print("-----------------------------")
print("Data Retrieval Complete ")
print("-----------------------------")

logfile.close()
```

```
City not found. Skipping...
Processing Record 18 of Set 22 | villa union
Processing Record 19 of Set 22 | arlit
Processing Record 20 of Set 22 | balkhash
Processing Record 21 of Set 22 | dingle
Processing Record 22 of Set 22 | evinayong
Processing Record 23 of Set 22 | tabukiniberu
City not found. Skipping...
Processing Record 24 of Set 22 | talcher
Processing Record 25 of Set 22 | asfi
City not found. Skipping...
Sleeping...
Processing Record 1 of Set 23 | tahoua
Processing Record 2 of Set 23 | falkenberg
Processing Record 3 of Set 23 | east london
Processing Record 4 of Set 23 | ust-kuyga
Processing Record 5 of Set 23 | noyon
Processing Record 6 of Set 23 | general roca
Processing Record 7 of Set 23 | muhoroni
Processing Record 8 of Set 23 | kirkwall
```

In [3]:

```
```

```
Beginning Data Retrieval
-----------------------------
Processing Record 1 of Set 1 | lompoc
Processing Record 2 of Set 1 | klaksvik
Processing Record 3 of Set 1 | bisignano
Processing Record 4 of Set 1 | bengkulu
City not found. Skipping...
Processing Record 5 of Set 1 | hilo
Processing Record 6 of Set 1 | rikitea
Processing Record 7 of Set 1 | ahipara
Processing Record 8 of Set 1 | lebu
Processing Record 9 of Set 1 | hamilton
Processing Record 10 of Set 1 | castro
Processing Record 11 of Set 1 | ashland
Processing Record 12 of Set 1 | ushuaia
Processing Record 13 of Set 1 | haines junction
Processing Record 14 of Set 1 | punta arenas
Processing Record 15 of Set 1 | salalah
Processing Record 16 of Set 1 | port macquarie
```

Convert Raw Data to DataFrame

- Export the city data into a .csv.
- Display the DataFrame

In [4]:

```
export_csv = df.to_csv ('output_data/export_dataframe.csv', index = None, h

df.head()
```

Out[4]:

	City	Cloudiness	Country	Date	Humidity	Lat	Lng	Max Temp	Wind Speed
0	bredasdorp	75	ZA	1567687732	63	-34.53	20.04	63	23.04
1	barrow	79	AR	1567687732	74	-38.31	-60.23	37.16	6.53
2	vaini	75	IN	1567687732	88	15.34	74.49	73.4	13.87
3	leningradskiy	92	RU	1567687732	92	69.38	178.42	39.5	3.22
4	mataura	100	NZ	1567687732	93	-46.19	168.86	46.99	3.87

In [6]:

```
```

Out[6]:

	City	Cloudiness	Country	Date	Humidity	Lat	Lng	Max Temp	Wind Speed
0	solnechnyy	100	RU	1567680841	98	50.72	136.64	60.37	4.52
1	yellowknife	90	CA	1567680841	93	62.45	-114.38	46.40	8.05
2	benavente	20	ES	1567680841	39	42.00	-5.67	70.00	5.82
3	amapa	20	HN	1567680842	83	15.09	-87.97	77.00	4.70
4	souillac	90	FR	1567680842	59	45.60	-0.60	68.00	8.05

In [5]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 532 entries, 0 to 531
Data columns (total 9 columns):
City          532 non-null object
Cloudiness    532 non-null object
Country       532 non-null object
Date          532 non-null object
Humidity      532 non-null object
Lat           532 non-null float64
Lng           532 non-null float64
Max Temp      532 non-null object
Wind Speed    532 non-null float64
dtypes: float64(3), object(6)
memory usage: 37.5+ KB
```

In [4]:

```
```

Out[4]:

```
City          547
Cloudiness    547
Country       547
Date          547
Humidity      547
Lat           547
Lng           547
Max Temp      547
Wind Speed    547
dtype: int64
```

Plotting the Data

- Use proper labeling of the plots using plot titles (including date of analysis) and axes labels.
- Save the plotted figures as .pngs.

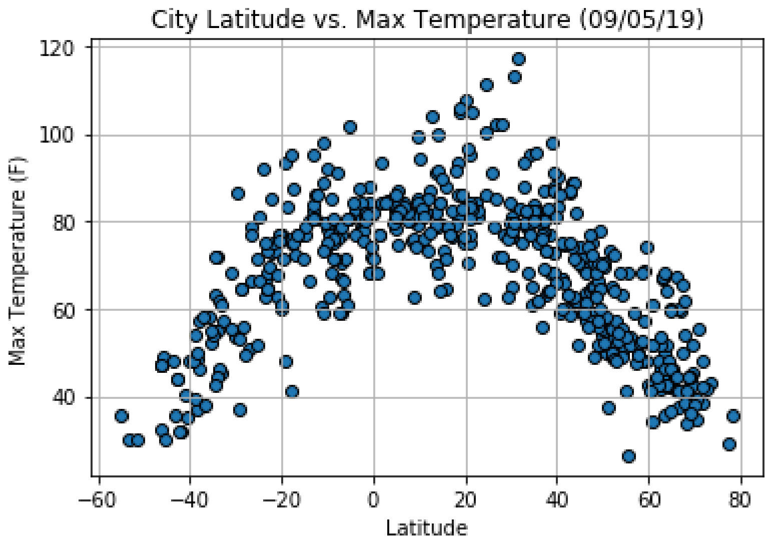
Latitude vs. Temperature Plot

In [6]:

```
latitude_x = df['Lat']
max_temp_y = df['Max Temp']

# Generate the Graph
plt.scatter(
    latitude_x,
    max_temp_y,
    edgecolors="black", label="Test")

# Incorporate the other graph properties
plt.xlabel('Latitude')
plt.ylabel('Max Temperature (F)')
plt.title(f'City Latitude vs. Max Temperature ({today.strftime("%m/%d/%y")}
plt.grid()

# Save Figure
plt.savefig("./output_data/City_Latitude_vs_Max_Temp.png")

plt
```

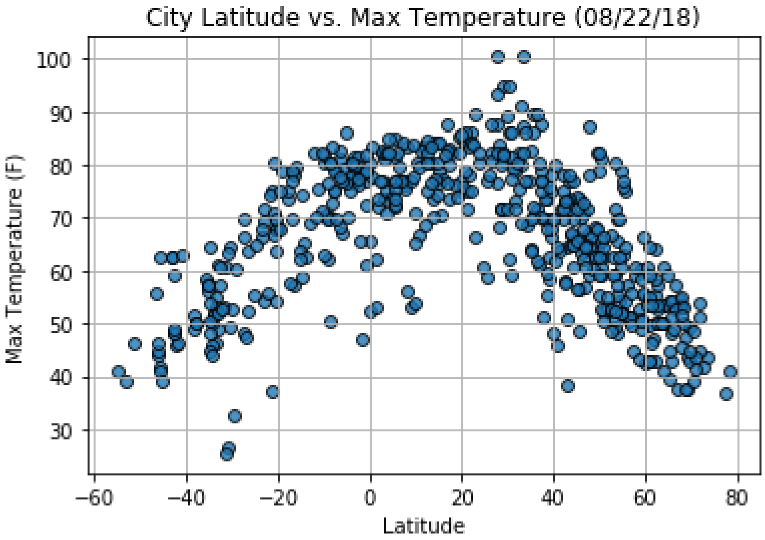
Out[6]:

```
<module 'matplotlib.pyplot' from '/Users/victordituro/anaconda3/lib/pytho
n3.7/site-packages/matplotlib/pyplot.py'>
```



In [ ]:

```
In [6]:
```



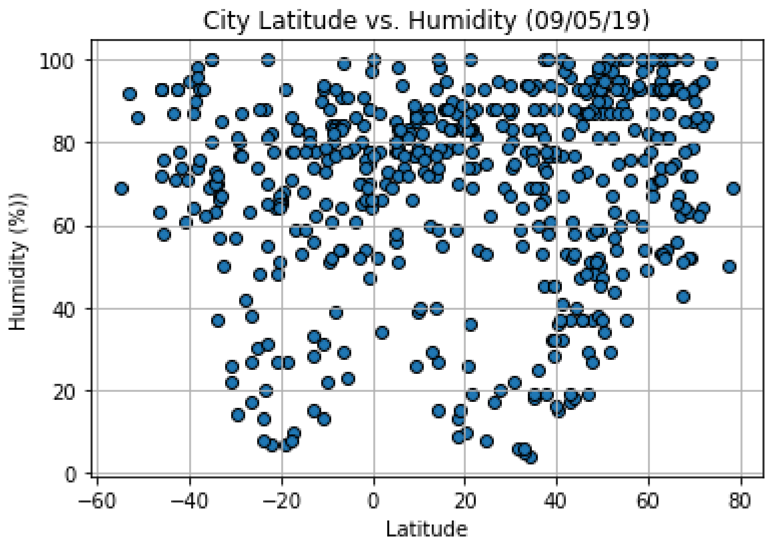
Latitude vs. Humidity Plot

In [7]:

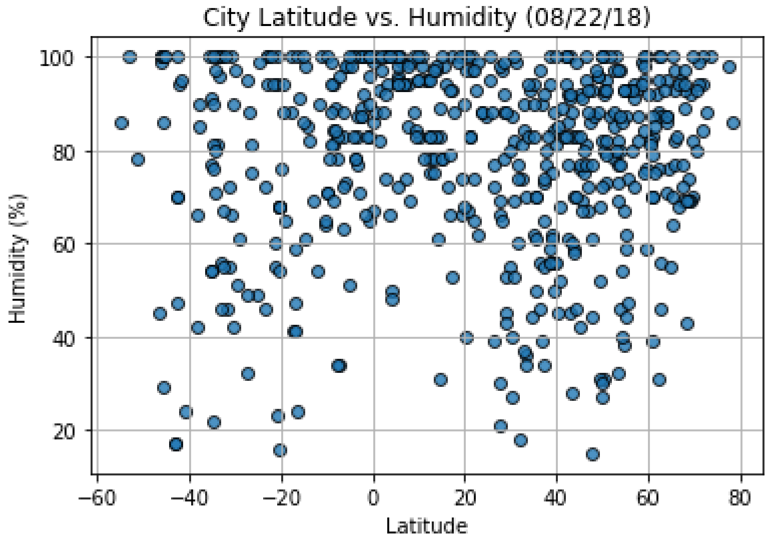
```
latitude_x = df['Lat']
humidity_y = df['Humidity']

# Generate the Graph
plt.scatter(
    latitude_x,
    humidity_y,
    edgecolors="black", label="Test")

# Incorporate the other graph properties
plt.xlabel('Latitude')
plt.ylabel('Humidity (%))')
plt.title(f'City Latitude vs. Humidity ({today.strftime("%m/%d/%y")})')
plt.grid()

# Save Figure
plt.savefig("./output_data/City_Latitude_vs_Humidity.png")

plt
```

Out[7]:

```
<module 'matplotlib.pyplot' from '/Users/victordituro/anaconda3/lib/pytho
n3.7/site-packages/matplotlib/pyplot.py'>
```



In [7]:



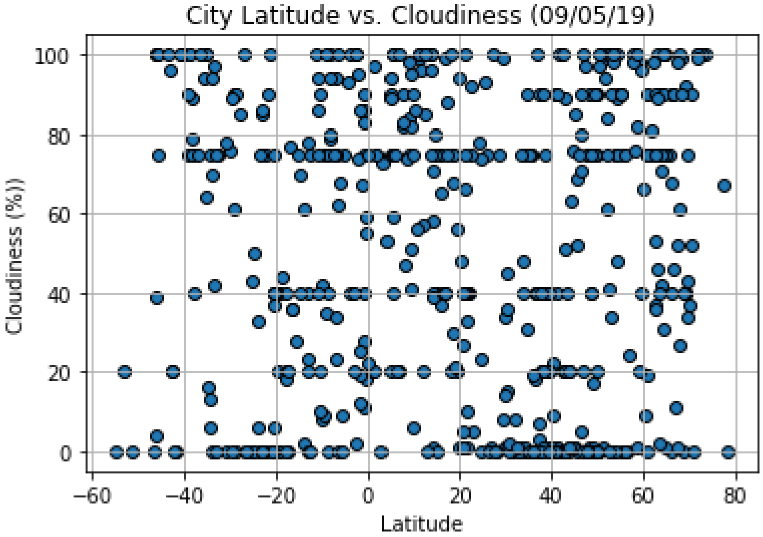
Latitude vs. Cloudiness Plot

In [8]:

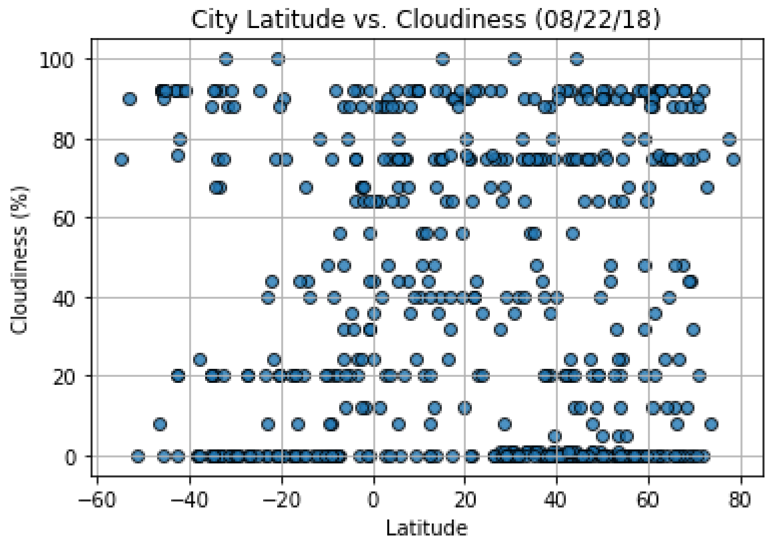
```
latitude_x = df['Lat']
cloudiness_y = df['Cloudiness']

# Generate the Graph
plt.scatter(
    latitude_x,
    cloudiness_y,
    edgecolors="black", label="Test")

# Incorporate the other graph properties
plt.xlabel('Latitude')
plt.ylabel('Cloudiness (%))')
plt.title(f'City Latitude vs. Cloudiness ({today.strftime("%m/%d/%y")})')
plt.grid()

# Save Figure
plt.savefig("./output_data/City_Latitude_vs_Cloudiness.png")

plt
```

Out[8]:

```
<module 'matplotlib.pyplot' from '/Users/victordituro/anaconda3/lib/pytho
n3.7/site-packages/matplotlib/pyplot.py'>
```



```
In [8]:
```



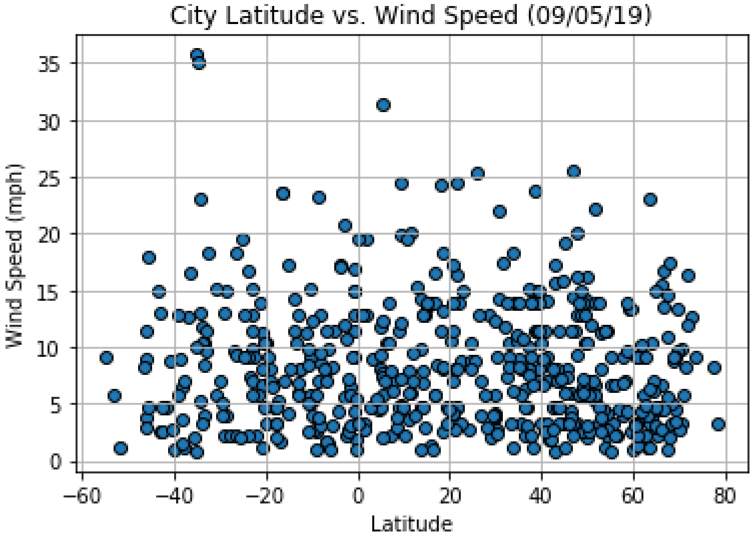
Latitude vs. Wind Speed Plot

In [9]:

```
latitude_x = df['Lat']
wind_speed_y = df['Wind Speed']

# Generate the Graph
plt.scatter(
    latitude_x,
    wind_speed_y,
    edgecolors="black", label="Test")

# Incorporate the other graph properties
plt.xlabel('Latitude')
plt.ylabel('Wind Speed (mph)')
plt.title(f'City Latitude vs. Wind Speed ({today.strftime("%m/%d/%y")})')
plt.grid()

# Save Figure
plt.savefig("./output_data/City_Latitude_vs_Wind_Speed.png")

plt
```

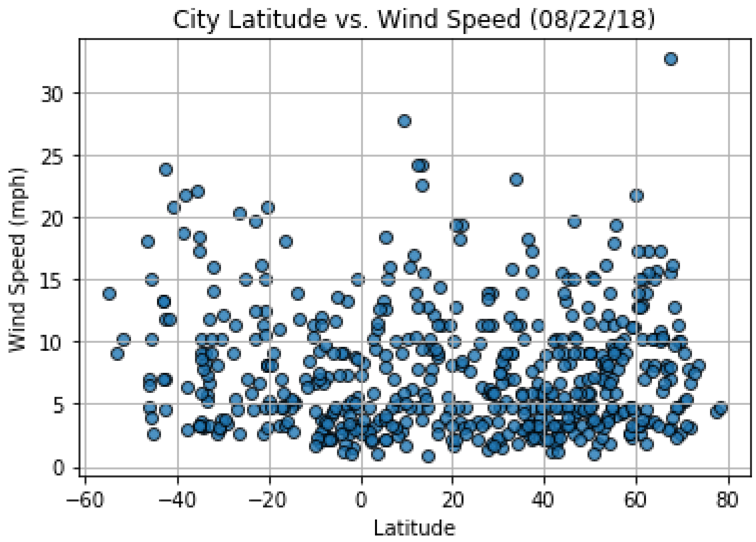
Out[9]:

```
<module 'matplotlib.pyplot' from '/Users/victordituro/anaconda3/lib/pytho
n3.7/site-packages/matplotlib/pyplot.py'>
```



In [9]:

```
```


City Latitude vs. Wind Speed (08/22/18)
Wind Speed (mph)
0
5
10
15
20
25
30
−60
−40
−20
0
20
40
60
80
Latitude

In [ ]:

```
```