In [1]:

```
# Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import requests
import time
import json
import csv


# Import API key
import api_keys

# 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 = (-90, 90)
lng_range = (-180, 180)

#%matplotlib notebook
%matplotlib inline
```

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=-90.000, high=90.000, size=1500)
lngs = np.random.uniform(low=-180.000, high=180.000, size=1500)
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]:

```
632
```

In [3]:

```
api_key = api_keys.api_key
```

In [4]:

```
cities = cities[:500]
```

In [5]:

```
city
```

Out[5]:

```
'ilulissat'
```

In [6]:

```
url = f"https://api.openweathermap.org/data/2.5/weather?q={city}&appid={api_key}"
```

In [7]:

```
response = requests.get(url)
```

In [8]:

```
response.status_code
```

Out[8]:

```
200
```

In [9]:

```python
response = requests.get(url).json()
print(json.dumps(response, indent=4, sort_keys=True))
```

```
{
    "base": "stations",
    "clouds": {
        "all": 80
    },
    "cod": 200,
    "coord": {
        "lat": 69.22,
        "lon": -51.1
    },
    "dt": 1539474600,
    "id": 3423146,
    "main": {
        "humidity": 73,
        "pressure": 998,
        "temp": 268.15,
        "temp_max": 268.15,
        "temp_min": 268.15
    },
    "name": "Ilulissat",
    "sys": {
        "country": "GL",
        "id": 4805,
        "message": 0.0033,
        "sunrise": 1539512981,
        "sunset": 1539546563,
        "type": 1
    },
    "weather": [
        {
            "description": "light snow",
            "icon": "13n",
            "id": 600,
            "main": "Snow"
        }
    ],
    "wind": {
        "deg": 130,
        "speed": 5.1
    }
}
```

In [10]:

```
#initializing list
citiesFound = []
clouds = []
country = []
dt = []
humidity = []
lat = []
lon = []
temp_max = []
speed = []

cities
```

Out[10]:

```
['ushuaia',
 'sur',
 'sakaiminato',
 'illoqqortoormiut',
 'kilindoni',
 'margate',
 'port alfred',
 'urdoma',
 'touros',
 'deputatskiy',
 'mahebourg',
 'rikitea',
 'new norfolk',
 'naryan-mar',
 'puerto ayora',
 'broome',
 'cape town',
 'mataura',
```

In [11]:

```
for city in cities:

    try:
        #print(city)
        url = f"https://api.openweathermap.org/data/2.5/weather?q={city}&appid={api_

        #time.sleep(1)

        response = requests.get(url).json()
        clouds.append(response['clouds']['all'])
        country.append(response['sys']['country'])
        dt.append(response['dt'])
        humidity.append(response['main']['humidity'])
        lat.append(response['coord']['lat'])
        lon.append(response['coord']['lon'])
        temp_max.append(response['main']['temp_max'])
        speed.append(response['wind']['speed'])
        speed.append(response["wind"]["speed"])
        citiesFound.append(city)

    except:
        #print("City Not Found")
        print(city)
```

```
illoqqortoormiut
vaitupu
nizhneyansk
olafsvik
taolanaro
bairiki
grand centre
tahta
khonuu
porto santo
kismayo
sataua
kuche
sosnovskiy
muzquiz
attawapiskat
viligili
barentsburg
belushya guba
labutta
torit
grand river south east
uwayl
lolua
tumannyy
marcona
poliyiros
sentyabrskiy
palabuhanratu
tsienyane
bengkulu
hvammstangi
vaovai
cruden bay
mergui
qandahar
tsihombe
utiroa
bokspits
tatawin
tungkang
laiagam
aflu
jinchengjiang
higuey
mys shmidta
kazalinsk
```

```
asau
pemangkat
saleaula
felidhoo
samalaeulu
korla
aktas
saryshagan
```

In [12]:

```
weather_dict = {
    "City": citiesFound,
    "Cloudiness": clouds,
    "Country": country,
    "Date": dt,
    "Humidity": humidity,
    "Lat": lat,
    "Lng": lon,
    "Max_Temp": temp_max,
    "Wind_Speed": speed
}
weather_data = pd.DataFrame(weather_dict)
weather_data.head()
```

Out[12]:

	City	Cloudiness	Country	Date	Humidity	Lat	Lng	Max_Temp	Wind_Spe
0	ushuaia	40	AR	1539475200	81	-54.81	-68.31	275.150	6.
1	sur	8	OM	1539477158	100	22.57	59.53	299.044	0.
2	sakaiminato	75	JP	1539475200	87	35.55	133.23	289.150	1.
3	kilindoni	76	TZ	1539477497	100	-7.91	39.67	299.244	4.
4	margate	75	AU	1539475200	59	-43.03	147.26	291.150	4.

In [13]:

```
weather_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 445 entries, 0 to 444
Data columns (total 9 columns):
City          445 non-null object
Cloudiness    445 non-null int64
Country       445 non-null object
Date          445 non-null int64
Humidity      445 non-null int64
Lat           445 non-null float64
Lng           445 non-null float64
Max_Temp      445 non-null float64
Wind_Speed    445 non-null float64
dtypes: float64(4), int64(3), object(2)
memory usage: 31.4+ KB
```

In [14]:

```
weather_data.describe()
```

Out[14]:

	Cloudiness	Date	Humidity	Lat	Lng	Max_Temp	Wind_Speed
count	445.000000	4.450000e+02	445.000000	445.000000	445.000000	445.000000	445.000000
mean	42.961798	1.539476e+09	78.793258	22.202225	12.799191	287.664881	3.691438
std	35.538913	1.298668e+03	19.710459	33.730373	89.872314	10.702577	2.697877
min	0.000000	1.539472e+09	6.000000	-54.810000	-173.230000	255.894000	0.320000
25%	1.000000	1.539475e+09	70.000000	-5.200000	-66.470000	280.350000	1.520000
50%	40.000000	1.539477e+09	82.000000	29.640000	14.170000	289.444000	3.100000
75%	76.000000	1.539478e+09	94.000000	50.100000	88.520000	296.494000	5.100000
max	100.000000	1.539478e+09	100.000000	78.220000	179.320000	307.150000	19.000000

In [15]:

```
weather_data.count()
```

Out[15]:

```
City          445
Cloudiness    445
Country       445
Date          445
Humidity      445
Lat           445
Lng           445
Max_Temp      445
Wind_Speed    445
dtype: int64
```

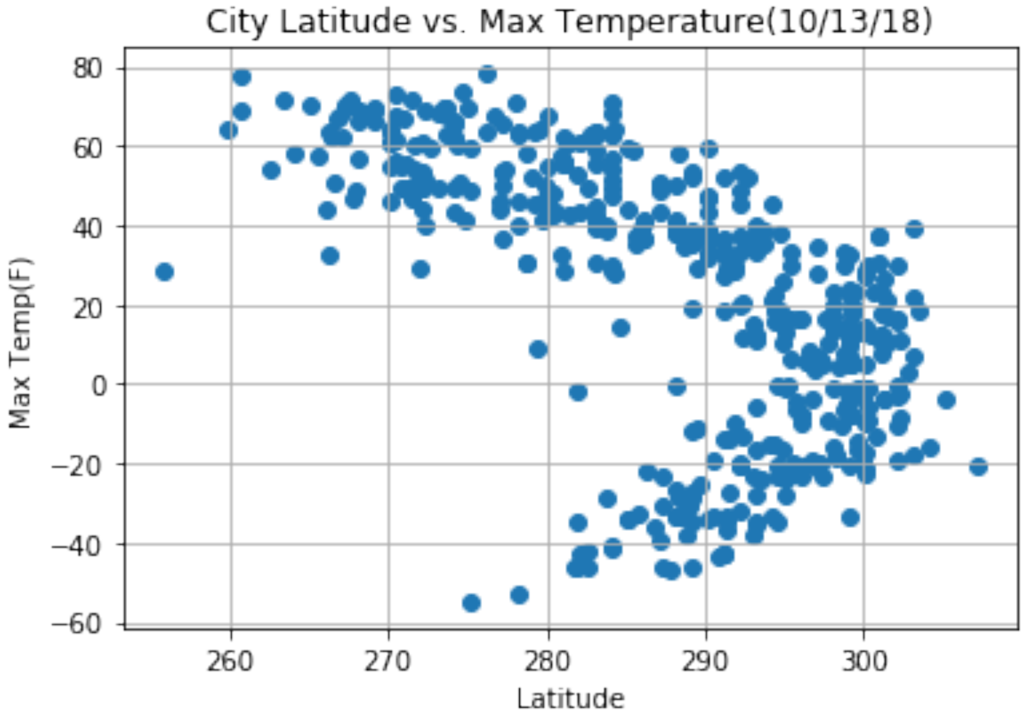
In [23]:

```
# # Build a scatter plot for each data type
plt.scatter(temp_max, lat)

# # Incorporate the other graph properties
plt.title("City Latitude vs. Max Temperature(10/13/18)")
plt.ylabel("Max Temp(F)")
plt.xlabel("Latitude")
plt.grid(True)

# Save the figure
plt.savefig("TemperatureInWorldCities.png")

#Show plot
plt.show()
```



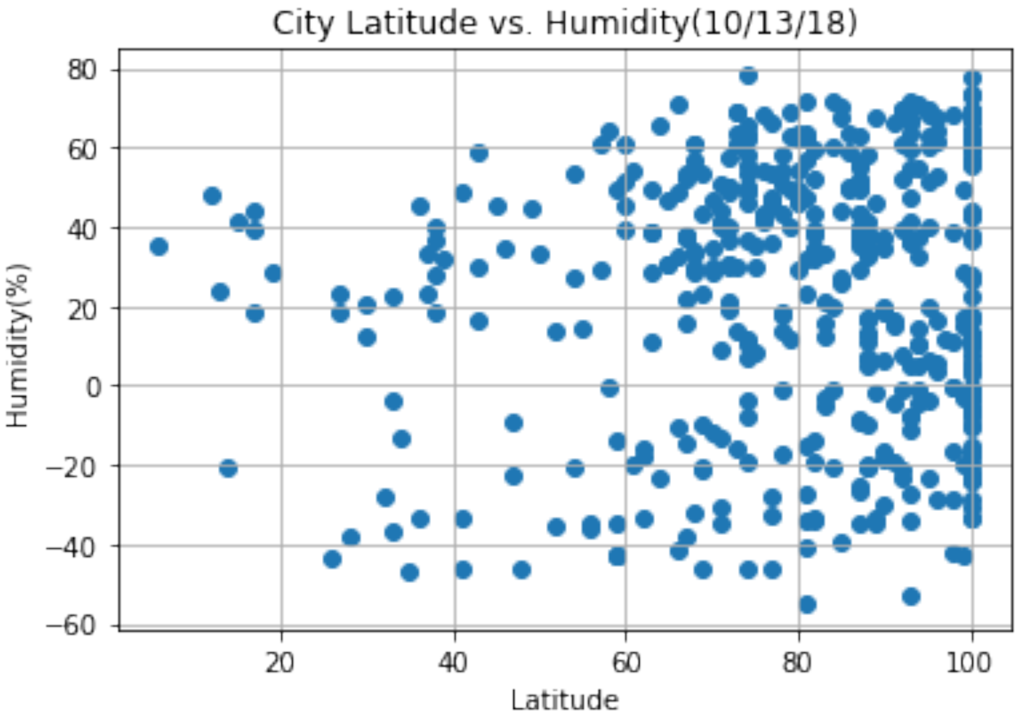
In [24]:

```
plt.scatter(humidity, lat)

# # Incorporate the other graph properties
plt.title("City Latitude vs. Humidity(10/13/18)")
plt.ylabel("Humidity(%)")
plt.xlabel("Latitude")
plt.grid(True)

# # Save the figure
plt.savefig("HumidityInWorldCities.png")

# # Show plot
plt.show()
```



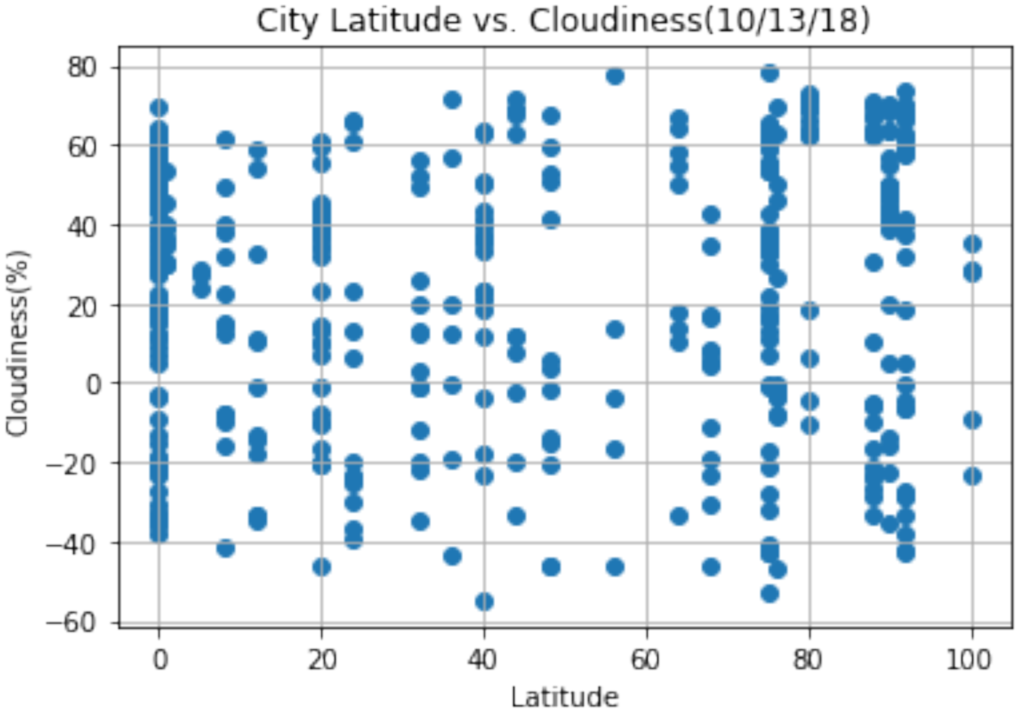
In [25]:

```
plt.scatter(clouds, lat)

# # Incorporate the other graph properties
plt.title("City Latitude vs. Cloudiness(10/13/18)")
plt.ylabel("Cloudiness(%)")
plt.xlabel("Latitude")
plt.grid(True)

# # Save the figure
plt.savefig("CloudinessInWorldCities.png")

# # Show plot
plt.show()
```



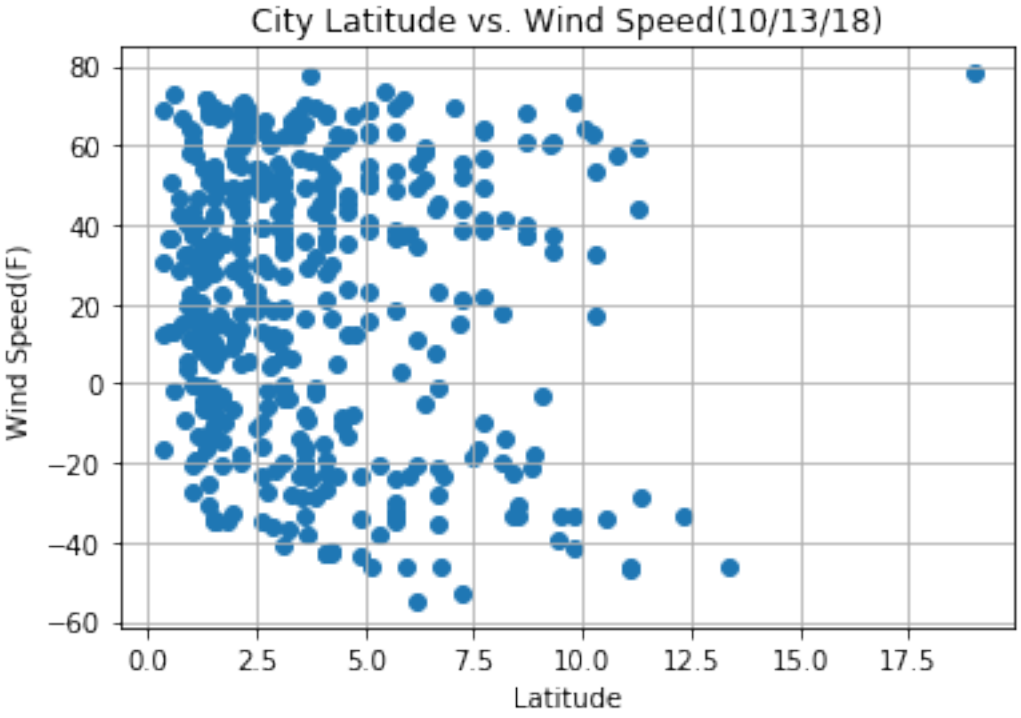
In [26]:

```
plt.scatter(speed, lat)

# # Incorporate the other graph properties
plt.title("City Latitude vs. Wind Speed(10/13/18)")
plt.ylabel("Wind Speed(F)")
plt.xlabel("Latitude")
plt.grid(True)

# # Save the figure
plt.savefig("WindSpeedInWorldCities.png")

# # Show plot
plt.show()
```



In [ ]: