WeatherPy

Starter Code to Generate Random Geographic Coordinates and a List of Cities

In [1]:
```python
# Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import requests
import time
from scipy.stats import linregress

# Impor the OpenWeatherMap API key
from api_keys import weather_api_key

# Import citipy to determine the cities based on latitude and longitude
from citipy import citipy
```

Generate the Cities List by Using the `citipy` Library

In [13]:
```python
# Empty list for holding the latitude and longitude combinations
lat_lngs = []

# Empty list for holding the cities names
cities = []

# Range of latitudes and longitudes
lat_range = (-90, 90)
lng_range = (-180, 180)

# Create a set of random lat and lng combinations
lats = np.random.uniform(lat_range[0], lat_range[1], size=1500)
lngs = np.random.uniform(lng_range[0], lng_range[1], 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
print(f"Number of cities in the list: {len(cities)}")
```

Number of cities in the list: 628

Requirement 1: Create Plots to Showcase the Relationship Between Weather Variables and

Latitude

Use the OpenWeatherMap API to retrieve weather data from the cities list generated in the started code

In [4]:
```python
# Set the API base URL
url = "http://api.openweathermap.org/data/2.5/weather?units=Imperial&APPID=" + wea

# Define an empty list to fetch the weather data for each city
city_data = []

# Print to logger
print("Beginning Data Retrieval     ")
print("-----------------------------")

# Create counters
record_count = 1
set_count = 1

# Loop through all the cities in our list to fetch weather data
for i, city in enumerate(cities):

    # Group cities in sets of 50 for logging purposes
    if (i % 50 == 0 and i >= 50):
        set_count += 1
        record_count = 0

    # Create endpoint URL with each city
    city_url = url + "&q=" + city

    # Log the url, record, and set numbers
    print("Processing Record %s of Set %s | %s" % (record_count, set_count, city))

    # Add 1 to the record count
    record_count += 1

    # Run an API request for each of the cities
    try:
        # Parse the JSON and retrieve data
        city_weather = requests.get(city_url).json()

        # Parse out latitude, longitude, max temp, humidity, cloudiness, wind speed
        city_lat = city_weather["coord"]["lat"]
        city_lng = city_weather["coord"]["lon"]
        city_max_temp = city_weather["main"]["temp_max"]
        city_humidity = city_weather["main"]["humidity"]
        city_clouds = city_weather["clouds"]["all"]
        city_wind = city_weather["wind"]["speed"]
        city_country = city_weather["sys"]["country"]
        city_date = city_weather["dt"]


        # Append the City information into city_data list
        city_data.append({"City": city,
                          "Lat": city_lat,
                          "Lng": city_lng,
                          "Max Temp": city_max_temp,
                          "Humidity": city_humidity,
                          "Cloudiness": city_clouds,
                          "Wind Speed": city_wind,
                          "Country": city_country,
```

```python
                        "Date": city_date})

    # If an error is experienced, skip the city
    except:
        print("City not found. Skipping...")
        pass

# Indicate that Data Loading is complete
print("-----------------------------")
print("Data Retrieval Complete      ")
print("-----------------------------")
```

```
Beginning Data Retrieval
-----------------------------
Processing Record 1 of Set 1 | yellowknife
Processing Record 2 of Set 1 | barranca
Processing Record 3 of Set 1 | myrtle beach
Processing Record 4 of Set 1 | bethel
Processing Record 5 of Set 1 | grytviken
Processing Record 6 of Set 1 | edinburgh of the seven seas
Processing Record 7 of Set 1 | arica
Processing Record 8 of Set 1 | yamazakicho-nakabirose
Processing Record 9 of Set 1 | qamdo
Processing Record 10 of Set 1 | sola
Processing Record 11 of Set 1 | la passe
Processing Record 12 of Set 1 | margaret river
Processing Record 13 of Set 1 | georgetown
Processing Record 14 of Set 1 | margate
Processing Record 15 of Set 1 | keflavik
Processing Record 16 of Set 1 | selizharovo
Processing Record 17 of Set 1 | west island
Processing Record 18 of Set 1 | college
Processing Record 19 of Set 1 | blackmans bay
Processing Record 20 of Set 1 | malanje
Processing Record 21 of Set 1 | jamestown
Processing Record 22 of Set 1 | port-aux-francais
Processing Record 23 of Set 1 | waitangi
Processing Record 24 of Set 1 | ahau
City not found. Skipping...
Processing Record 25 of Set 1 | lata
Processing Record 26 of Set 1 | bandarbeyla
Processing Record 27 of Set 1 | luderitz
Processing Record 28 of Set 1 | petropavlovsk-kamchatsky
Processing Record 29 of Set 1 | ust-nera
Processing Record 30 of Set 1 | stanley
Processing Record 31 of Set 1 | essaouira
Processing Record 32 of Set 1 | adamstown
Processing Record 33 of Set 1 | longyearbyen
Processing Record 34 of Set 1 | walvis bay
Processing Record 35 of Set 1 | papatowai
Processing Record 36 of Set 1 | dwarka
Processing Record 37 of Set 1 | ushuaia
Processing Record 38 of Set 1 | suai
City not found. Skipping...
Processing Record 39 of Set 1 | bilibino
Processing Record 40 of Set 1 | belmonte
Processing Record 41 of Set 1 | khandyga
Processing Record 42 of Set 1 | anadyr
Processing Record 43 of Set 1 | san patricio
Processing Record 44 of Set 1 | dudinka
Processing Record 45 of Set 1 | menzelinsk
Processing Record 46 of Set 1 | sardarshahr
Processing Record 47 of Set 1 | qaqortoq
Processing Record 48 of Set 1 | lezajsk
Processing Record 49 of Set 1 | rio grande
Processing Record 50 of Set 1 | port elizabeth
Processing Record 0 of Set 2 | polovinnoye
Processing Record 1 of Set 2 | chibougamau
Processing Record 2 of Set 2 | st. john's
Processing Record 3 of Set 2 | robertsport
Processing Record 4 of Set 2 | hayma'
City not found. Skipping...
Processing Record 5 of Set 2 | aldinga beach
Processing Record 6 of Set 2 | puerto natales
Processing Record 7 of Set 2 | martapura
Processing Record 8 of Set 2 | happy valley-goose bay
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Processing Record 9 of Set 2 | yung shue wan
Processing Record 10 of Set 2 | afaahiti
Processing Record 11 of Set 2 | summerside
Processing Record 12 of Set 2 | hamilton
Processing Record 13 of Set 2 | kulia village
City not found. Skipping...
Processing Record 14 of Set 2 | east london
Processing Record 15 of Set 2 | fuvahmulah
City not found. Skipping...
Processing Record 16 of Set 2 | arapgir
Processing Record 17 of Set 2 | yuzhno-kurilsk
Processing Record 18 of Set 2 | ulsteinvik
Processing Record 19 of Set 2 | tranovaho
City not found. Skipping...
Processing Record 20 of Set 2 | christchurch
Processing Record 21 of Set 2 | puerto ayora
Processing Record 22 of Set 2 | fale old settlement
Processing Record 23 of Set 2 | pandan
Processing Record 24 of Set 2 | kharkhorin
Processing Record 25 of Set 2 | olonkinbyen
Processing Record 26 of Set 2 | albany
Processing Record 27 of Set 2 | hawaiian paradise park
Processing Record 28 of Set 2 | wailua homesteads
Processing Record 29 of Set 2 | bredasdorp
Processing Record 30 of Set 2 | fort st. john
Processing Record 31 of Set 2 | crane
Processing Record 32 of Set 2 | i-n-salah
Processing Record 33 of Set 2 | cambria
Processing Record 34 of Set 2 | newman
Processing Record 35 of Set 2 | glace bay
Processing Record 36 of Set 2 | greymouth
Processing Record 37 of Set 2 | sotouboua
Processing Record 38 of Set 2 | trenggalek
Processing Record 39 of Set 2 | touros
Processing Record 40 of Set 2 | klyuchi
Processing Record 41 of Set 2 | mugia
Processing Record 42 of Set 2 | kodiak
Processing Record 43 of Set 2 | rockland
Processing Record 44 of Set 2 | utrik
Processing Record 45 of Set 2 | geraldton
Processing Record 46 of Set 2 | qui nhon
Processing Record 47 of Set 2 | eastham
Processing Record 48 of Set 2 | okha
Processing Record 49 of Set 2 | angra do heroismo
Processing Record 0 of Set 3 | tiksi
Processing Record 1 of Set 3 | am djarass
City not found. Skipping...
Processing Record 2 of Set 3 | pacific grove
Processing Record 3 of Set 3 | udachny
Processing Record 4 of Set 3 | miguel ahumada
Processing Record 5 of Set 3 | road town
Processing Record 6 of Set 3 | spearfish
Processing Record 7 of Set 3 | badger
Processing Record 8 of Set 3 | ibaiti
Processing Record 9 of Set 3 | barabai
Processing Record 10 of Set 3 | weno
Processing Record 11 of Set 3 | vilyuchinsk
Processing Record 12 of Set 3 | shajiang
Processing Record 13 of Set 3 | port lincoln
Processing Record 14 of Set 3 | alta
Processing Record 15 of Set 3 | yanchep
Processing Record 16 of Set 3 | iqaluit
Processing Record 17 of Set 3 | tamandare
Processing Record 18 of Set 3 | tanjung selor
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City not found. Skipping...
Processing Record 19 of Set 3 | larkird
Processing Record 20 of Set 3 | merizo village
Processing Record 21 of Set 3 | chiredzi
Processing Record 22 of Set 3 | lucapa
Processing Record 23 of Set 3 | invercargill
Processing Record 24 of Set 3 | rongelap
Processing Record 25 of Set 3 | enewetak
Processing Record 26 of Set 3 | soe
Processing Record 27 of Set 3 | ribeira grande
Processing Record 28 of Set 3 | abingdon
Processing Record 29 of Set 3 | san luis
Processing Record 30 of Set 3 | pyt-yakh
Processing Record 31 of Set 3 | okakarara
Processing Record 32 of Set 3 | ambohitrandriamanitra
City not found. Skipping...
Processing Record 33 of Set 3 | pingliang
Processing Record 34 of Set 3 | uribia
Processing Record 35 of Set 3 | taiohae
City not found. Skipping...
Processing Record 36 of Set 3 | cockburn town
Processing Record 37 of Set 3 | garoua boulai
Processing Record 38 of Set 3 | lamu
Processing Record 39 of Set 3 | giyani
Processing Record 40 of Set 3 | bubaque
Processing Record 41 of Set 3 | mpika
Processing Record 42 of Set 3 | tolanaro
Processing Record 43 of Set 3 | itoman
Processing Record 44 of Set 3 | gemena
Processing Record 45 of Set 3 | midvagur
Processing Record 46 of Set 3 | mount pearl
Processing Record 47 of Set 3 | ta`u
Processing Record 48 of Set 3 | isafjordur
Processing Record 49 of Set 3 | mhangura
Processing Record 0 of Set 4 | guozhen
Processing Record 1 of Set 4 | gamay
Processing Record 2 of Set 4 | hami
Processing Record 3 of Set 4 | bikenibeu village
Processing Record 4 of Set 4 | filingue
Processing Record 5 of Set 4 | pontes e lacerda
Processing Record 6 of Set 4 | lihue
Processing Record 7 of Set 4 | posse
Processing Record 8 of Set 4 | iskateley
Processing Record 9 of Set 4 | mount gambier
Processing Record 10 of Set 4 | hithadhoo
Processing Record 11 of Set 4 | conception bay south
Processing Record 12 of Set 4 | ruteng
Processing Record 13 of Set 4 | bamboo flat
Processing Record 14 of Set 4 | cabo san lucas
Processing Record 15 of Set 4 | egilsstadir
Processing Record 16 of Set 4 | smach mean chey
City not found. Skipping...
Processing Record 17 of Set 4 | ad dilam
Processing Record 18 of Set 4 | tralee
Processing Record 19 of Set 4 | punta arenas
Processing Record 20 of Set 4 | pak phanang
Processing Record 21 of Set 4 | fort bragg
Processing Record 22 of Set 4 | san andres
Processing Record 23 of Set 4 | lagoa
Processing Record 24 of Set 4 | san luis de la loma
Processing Record 25 of Set 4 | suluru
Processing Record 26 of Set 4 | kavaratti
Processing Record 27 of Set 4 | tionk essil
Processing Record 28 of Set 4 | talas
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Processing Record 29 of Set 4 | oxelosund
Processing Record 30 of Set 4 | gouyave
Processing Record 31 of Set 4 | vorgashor
Processing Record 32 of Set 4 | birendranagar
Processing Record 33 of Set 4 | molde
Processing Record 34 of Set 4 | durazno
Processing Record 35 of Set 4 | alaghsas
Processing Record 36 of Set 4 | luohe
Processing Record 37 of Set 4 | bemidji
Processing Record 38 of Set 4 | zyryanskoye
Processing Record 39 of Set 4 | sasebo
Processing Record 40 of Set 4 | thunder bay
Processing Record 41 of Set 4 | kostanay
Processing Record 42 of Set 4 | portland
Processing Record 43 of Set 4 | riohacha
Processing Record 44 of Set 4 | harper
Processing Record 45 of Set 4 | severoural'sk
Processing Record 46 of Set 4 | lumphat
Processing Record 47 of Set 4 | haiku-pauwela
Processing Record 48 of Set 4 | knyaze-volkonskoye
Processing Record 49 of Set 4 | alice springs
Processing Record 0 of Set 5 | north battleford
Processing Record 1 of Set 5 | thompson
Processing Record 2 of Set 5 | ilhabela
Processing Record 3 of Set 5 | hermanus
Processing Record 4 of Set 5 | palikir - national government center
Processing Record 5 of Set 5 | metlili chaamba
Processing Record 6 of Set 5 | kirensk
Processing Record 7 of Set 5 | port alfred
Processing Record 8 of Set 5 | nkurenkuru
City not found. Skipping...
Processing Record 9 of Set 5 | arenapolis
Processing Record 10 of Set 5 | chonchi
Processing Record 11 of Set 5 | darnah
Processing Record 12 of Set 5 | andovoranto
Processing Record 13 of Set 5 | aplahoue
Processing Record 14 of Set 5 | dayr samit
Processing Record 15 of Set 5 | lagunas
Processing Record 16 of Set 5 | la reforma
Processing Record 17 of Set 5 | aykhal
Processing Record 18 of Set 5 | muzayri'
City not found. Skipping...
Processing Record 19 of Set 5 | baruun-urt
Processing Record 20 of Set 5 | terrace
Processing Record 21 of Set 5 | guru har sahai
Processing Record 22 of Set 5 | tsiombe
Processing Record 23 of Set 5 | prey veng
Processing Record 24 of Set 5 | nilopolis
Processing Record 25 of Set 5 | qianjiang
Processing Record 26 of Set 5 | labrador city
Processing Record 27 of Set 5 | inari
Processing Record 28 of Set 5 | villa gesell
Processing Record 29 of Set 5 | korla
Processing Record 30 of Set 5 | luena
Processing Record 31 of Set 5 | avarua
Processing Record 32 of Set 5 | kattivakkam
Processing Record 33 of Set 5 | flin flon
Processing Record 34 of Set 5 | kone
Processing Record 35 of Set 5 | el dorado
Processing Record 36 of Set 5 | uturoa
Processing Record 37 of Set 5 | ad douiem
Processing Record 38 of Set 5 | mahina
Processing Record 39 of Set 5 | caconda
Processing Record 40 of Set 5 | santa marta
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Processing Record 41 of Set 5 | lerwick
Processing Record 42 of Set 5 | kedainiai
Processing Record 43 of Set 5 | ngunut
Processing Record 44 of Set 5 | russkiy kameshkir
Processing Record 45 of Set 5 | licata
Processing Record 46 of Set 5 | santa marinella
Processing Record 47 of Set 5 | cheremukhovo
Processing Record 48 of Set 5 | ola
Processing Record 49 of Set 5 | firmat
Processing Record 0 of Set 6 | kristinestad
Processing Record 1 of Set 6 | madera
Processing Record 2 of Set 6 | wynyard
Processing Record 3 of Set 6 | hisor
Processing Record 4 of Set 6 | puerto san carlos
City not found. Skipping...
Processing Record 5 of Set 6 | yanykurgan
Processing Record 6 of Set 6 | ilulissat
Processing Record 7 of Set 6 | mariental
Processing Record 8 of Set 6 | galveston
Processing Record 9 of Set 6 | coxim
Processing Record 10 of Set 6 | port macquarie
Processing Record 11 of Set 6 | nguigmi
Processing Record 12 of Set 6 | alofi
Processing Record 13 of Set 6 | bereeda
Processing Record 14 of Set 6 | aasiaat
Processing Record 15 of Set 6 | mont-laurier
Processing Record 16 of Set 6 | argo
Processing Record 17 of Set 6 | palmer
Processing Record 18 of Set 6 | devils lake
Processing Record 19 of Set 6 | pachino
Processing Record 20 of Set 6 | guiuan
Processing Record 21 of Set 6 | amboasary
Processing Record 22 of Set 6 | coahuayana de hidalgo
Processing Record 23 of Set 6 | filipstad
Processing Record 24 of Set 6 | rikaze
Processing Record 25 of Set 6 | colonia
Processing Record 26 of Set 6 | altay
Processing Record 27 of Set 6 | nar'yan-mar
Processing Record 28 of Set 6 | kalmunai
Processing Record 29 of Set 6 | lebu
Processing Record 30 of Set 6 | tutoia
Processing Record 31 of Set 6 | zhanaozen
Processing Record 32 of Set 6 | harstad
Processing Record 33 of Set 6 | lompoc
Processing Record 34 of Set 6 | ketchikan
Processing Record 35 of Set 6 | prince rupert
Processing Record 36 of Set 6 | timbuktu
Processing Record 37 of Set 6 | saipan
Processing Record 38 of Set 6 | polyarnyy
Processing Record 39 of Set 6 | papao
Processing Record 40 of Set 6 | saldanha
Processing Record 41 of Set 6 | devinuwara
City not found. Skipping...
Processing Record 42 of Set 6 | caala
Processing Record 43 of Set 6 | chicomuselo
Processing Record 44 of Set 6 | katsuren-haebaru
Processing Record 45 of Set 6 | sisimiut
Processing Record 46 of Set 6 | mulanje
Processing Record 47 of Set 6 | sinabang
Processing Record 48 of Set 6 | kropyvnytskyi
Processing Record 49 of Set 6 | pematangsiantar
Processing Record 0 of Set 7 | kayangel
Processing Record 1 of Set 7 | saint-philippe
Processing Record 2 of Set 7 | whitehorse
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Processing Record 3 of Set 7 | at taraf
Processing Record 4 of Set 7 | tongliao
Processing Record 5 of Set 7 | port augusta
Processing Record 6 of Set 7 | pokrovo-prigorodnoye
Processing Record 7 of Set 7 | saint-francois
Processing Record 8 of Set 7 | hasaki
Processing Record 9 of Set 7 | arraial do cabo
Processing Record 10 of Set 7 | praia da vitoria
Processing Record 11 of Set 7 | kavieng
Processing Record 12 of Set 7 | namibe
Processing Record 13 of Set 7 | heinsch
Processing Record 14 of Set 7 | mar del plata
Processing Record 15 of Set 7 | argostolion
Processing Record 16 of Set 7 | parepare
City not found. Skipping...
Processing Record 17 of Set 7 | mumford
Processing Record 18 of Set 7 | ulladulla
Processing Record 19 of Set 7 | vershino-darasunskiy
Processing Record 20 of Set 7 | arkhara
Processing Record 21 of Set 7 | medina
Processing Record 22 of Set 7 | primero de mayo
Processing Record 23 of Set 7 | ca mau
Processing Record 24 of Set 7 | tangalle
Processing Record 25 of Set 7 | ulety
Processing Record 26 of Set 7 | igrim
Processing Record 27 of Set 7 | karratha
Processing Record 28 of Set 7 | atmakur
Processing Record 29 of Set 7 | leer
Processing Record 30 of Set 7 | thayetmyo
Processing Record 31 of Set 7 | vadso
Processing Record 32 of Set 7 | quellon
Processing Record 33 of Set 7 | san antonio de pale
Processing Record 34 of Set 7 | calama
Processing Record 35 of Set 7 | redding
Processing Record 36 of Set 7 | puerto deseado
Processing Record 37 of Set 7 | pangoa
Processing Record 38 of Set 7 | sao joao da barra
Processing Record 39 of Set 7 | bhatapara
Processing Record 40 of Set 7 | belomorsk
Processing Record 41 of Set 7 | carutapera
Processing Record 42 of Set 7 | dean funes
Processing Record 43 of Set 7 | hammerfest
Processing Record 44 of Set 7 | minas de marcona
Processing Record 45 of Set 7 | beroroha
Processing Record 46 of Set 7 | solnechnyy
Processing Record 47 of Set 7 | al ghayzah
Processing Record 48 of Set 7 | susuman
Processing Record 49 of Set 7 | arvayheer
Processing Record 0 of Set 8 | nemuro
Processing Record 1 of Set 8 | new shagunnu
Processing Record 2 of Set 8 | ponta delgada
Processing Record 3 of Set 8 | flying fish cove
Processing Record 4 of Set 8 | laibin
Processing Record 5 of Set 8 | payson
Processing Record 6 of Set 8 | inongo
Processing Record 7 of Set 8 | deqen
Processing Record 8 of Set 8 | namsos
Processing Record 9 of Set 8 | pimentel
Processing Record 10 of Set 8 | kantagi
Processing Record 11 of Set 8 | zelenoborskiy
Processing Record 12 of Set 8 | berwick-upon-tweed
Processing Record 13 of Set 8 | the pas
Processing Record 14 of Set 8 | chernyshevskiy
Processing Record 15 of Set 8 | iquique
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Processing Record 16 of Set 8 | tokar
Processing Record 17 of Set 8 | carnarvon
Processing Record 18 of Set 8 | kushiro
Processing Record 19 of Set 8 | boguchar
Processing Record 20 of Set 8 | mossendjo
Processing Record 21 of Set 8 | hailar
Processing Record 22 of Set 8 | usogorsk
Processing Record 23 of Set 8 | novokazalinsk
City not found. Skipping...
Processing Record 24 of Set 8 | tindouf
Processing Record 25 of Set 8 | enriquillo
Processing Record 26 of Set 8 | magadan
Processing Record 27 of Set 8 | caleta olivia
Processing Record 28 of Set 8 | petlawad
Processing Record 29 of Set 8 | kikwit
Processing Record 30 of Set 8 | port mathurin
Processing Record 31 of Set 8 | pasargad
City not found. Skipping...
Processing Record 32 of Set 8 | baidoa
Processing Record 33 of Set 8 | rabo de peixe
Processing Record 34 of Set 8 | griffith
Processing Record 35 of Set 8 | talnakh
Processing Record 36 of Set 8 | al burayqah
Processing Record 37 of Set 8 | forster
Processing Record 38 of Set 8 | tura
Processing Record 39 of Set 8 | mbanza kongo
Processing Record 40 of Set 8 | zeya
Processing Record 41 of Set 8 | saudarkrokur
Processing Record 42 of Set 8 | ath thawrah
Processing Record 43 of Set 8 | thames
Processing Record 44 of Set 8 | san juan
Processing Record 45 of Set 8 | tazacorte
Processing Record 46 of Set 8 | porto novo
Processing Record 47 of Set 8 | caleta de carquin
Processing Record 48 of Set 8 | sao miguel do araguaia
Processing Record 49 of Set 8 | sidney
Processing Record 0 of Set 9 | awjilah
Processing Record 1 of Set 9 | tuy hoa
Processing Record 2 of Set 9 | nyala
Processing Record 3 of Set 9 | arthur's town
City not found. Skipping...
Processing Record 4 of Set 9 | mont-joli
Processing Record 5 of Set 9 | kailua-kona
Processing Record 6 of Set 9 | tabou
Processing Record 7 of Set 9 | puerto baquerizo moreno
Processing Record 8 of Set 9 | pauini
Processing Record 9 of Set 9 | kapuskasing
Processing Record 10 of Set 9 | sitka
Processing Record 11 of Set 9 | vytegra
Processing Record 12 of Set 9 | kolwezi
Processing Record 13 of Set 9 | ghanzi
Processing Record 14 of Set 9 | olinda
Processing Record 15 of Set 9 | bonthe
Processing Record 16 of Set 9 | san agustin de valle fertil
Processing Record 17 of Set 9 | gamba
Processing Record 18 of Set 9 | cadale
Processing Record 19 of Set 9 | penonome
Processing Record 20 of Set 9 | hanceville
Processing Record 21 of Set 9 | jinsha
Processing Record 22 of Set 9 | pathein
Processing Record 23 of Set 9 | xique xique
Processing Record 24 of Set 9 | san ignacio de velasco
Processing Record 25 of Set 9 | howrah
Processing Record 26 of Set 9 | nova sintra
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Processing Record 27 of Set 9 | oualidia
City not found. Skipping...
Processing Record 28 of Set 9 | mogocha
Processing Record 29 of Set 9 | brookings
Processing Record 30 of Set 9 | balikpapan
Processing Record 31 of Set 9 | palmeira
Processing Record 32 of Set 9 | selfoss
Processing Record 33 of Set 9 | kathwana
City not found. Skipping...
Processing Record 34 of Set 9 | bulgan
Processing Record 35 of Set 9 | puttalam
Processing Record 36 of Set 9 | el calafate
Processing Record 37 of Set 9 | vingt cinq
City not found. Skipping...
Processing Record 38 of Set 9 | binzhou
Processing Record 39 of Set 9 | kotlas
Processing Record 40 of Set 9 | pangody
Processing Record 41 of Set 9 | fortuna
Processing Record 42 of Set 9 | kingston
Processing Record 43 of Set 9 | burang
Processing Record 44 of Set 9 | edson
Processing Record 45 of Set 9 | ajdabiya
Processing Record 46 of Set 9 | tazovsky
Processing Record 47 of Set 9 | fortaleza
Processing Record 48 of Set 9 | swift current
Processing Record 49 of Set 9 | kanniyakumari
Processing Record 0 of Set 10 | isangel
Processing Record 1 of Set 10 | salekhard
Processing Record 2 of Set 10 | jindabyne
Processing Record 3 of Set 10 | shimoda
Processing Record 4 of Set 10 | vernon
Processing Record 5 of Set 10 | yantai
Processing Record 6 of Set 10 | duba
Processing Record 7 of Set 10 | komsomolets
Processing Record 8 of Set 10 | northam
Processing Record 9 of Set 10 | altamira
Processing Record 10 of Set 10 | nizao
Processing Record 11 of Set 10 | salinas
Processing Record 12 of Set 10 | newnham
Processing Record 13 of Set 10 | hojo
Processing Record 14 of Set 10 | cill airne
Processing Record 15 of Set 10 | grande prairie
Processing Record 16 of Set 10 | constantia
Processing Record 17 of Set 10 | anatuya
Processing Record 18 of Set 10 | el carril
Processing Record 19 of Set 10 | yaren
Processing Record 20 of Set 10 | karasu
Processing Record 21 of Set 10 | sake
Processing Record 22 of Set 10 | kolokani
Processing Record 23 of Set 10 | askino
Processing Record 24 of Set 10 | pisco
Processing Record 25 of Set 10 | charleston
Processing Record 26 of Set 10 | kimbe
Processing Record 27 of Set 10 | nizhniy kuranakh
Processing Record 28 of Set 10 | el fasher
Processing Record 29 of Set 10 | 'ohonua
City not found. Skipping...
Processing Record 30 of Set 10 | atafu village
Processing Record 31 of Set 10 | serafimovskiy
Processing Record 32 of Set 10 | lazaro cardenas
Processing Record 33 of Set 10 | sirnak
Processing Record 34 of Set 10 | luwuk
Processing Record 35 of Set 10 | grootfontein
Processing Record 36 of Set 10 | tharangambadi
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Processing Record 37 of Set 10 | tinana
City not found. Skipping...
Processing Record 38 of Set 10 | dawei
Processing Record 39 of Set 10 | de aar
Processing Record 40 of Set 10 | jinka
Processing Record 41 of Set 10 | kongolo
Processing Record 42 of Set 10 | kruisfontein
Processing Record 43 of Set 10 | severo-yeniseyskiy
Processing Record 44 of Set 10 | little cayman
City not found. Skipping...
Processing Record 45 of Set 10 | kinablangan
Processing Record 46 of Set 10 | bridgewater
Processing Record 47 of Set 10 | krasnoufimsk
Processing Record 48 of Set 10 | camarinas
Processing Record 49 of Set 10 | bodaybo
Processing Record 0 of Set 11 | guelmim
Processing Record 1 of Set 11 | hosa'ina
City not found. Skipping...
Processing Record 2 of Set 11 | tambopata
Processing Record 3 of Set 11 | cannonvale
Processing Record 4 of Set 11 | svetlyy
Processing Record 5 of Set 11 | mana
Processing Record 6 of Set 11 | yershov
Processing Record 7 of Set 11 | yichang
Processing Record 8 of Set 11 | shubarshi
Processing Record 9 of Set 11 | nampa
Processing Record 10 of Set 11 | hadibu
Processing Record 11 of Set 11 | broken hill
Processing Record 12 of Set 11 | esmeraldas
Processing Record 13 of Set 11 | grand falls-windsor
Processing Record 14 of Set 11 | soio
Processing Record 15 of Set 11 | artesia
Processing Record 16 of Set 11 | lospalos
Processing Record 17 of Set 11 | turkmenbasy
Processing Record 18 of Set 11 | saint-joseph
Processing Record 19 of Set 11 | bargara
City not found. Skipping...
Processing Record 20 of Set 11 | salalah
Processing Record 21 of Set 11 | chukhloma
Processing Record 22 of Set 11 | shache
Processing Record 23 of Set 11 | sampit
Processing Record 24 of Set 11 | montevideo
Processing Record 25 of Set 11 | adrar
Processing Record 26 of Set 11 | tadine
Processing Record 27 of Set 11 | hilo
Processing Record 28 of Set 11 | nizhniy odes
Processing Record 29 of Set 11 | remire-montjoly
Processing Record 30 of Set 11 | ouadda
Processing Record 31 of Set 11 | volokolamsk
Processing Record 32 of Set 11 | fandriana
Processing Record 33 of Set 11 | hovd
Processing Record 34 of Set 11 | laguna
Processing Record 35 of Set 11 | floro
Processing Record 36 of Set 11 | la'ie
Processing Record 37 of Set 11 | mocimboa
Processing Record 38 of Set 11 | manuel ojinaga
City not found. Skipping...
Processing Record 39 of Set 11 | tra mhor
Processing Record 40 of Set 11 | revda
Processing Record 41 of Set 11 | yarmouth
Processing Record 42 of Set 11 | winslow
Processing Record 43 of Set 11 | igarka
Processing Record 44 of Set 11 | hono
Processing Record 45 of Set 11 | vila franca do campo
```

```
Processing Record 46 of Set 11 | prineville
Processing Record 47 of Set 11 | shimokizukuri
Processing Record 48 of Set 11 | puerto lempira
Processing Record 49 of Set 11 | nizhneangarsk
Processing Record 0 of Set 12 | nuuk
Processing Record 1 of Set 12 | kuala belait
Processing Record 2 of Set 12 | kalianget
Processing Record 3 of Set 12 | ghat
Processing Record 4 of Set 12 | port moresby
Processing Record 5 of Set 12 | maham
Processing Record 6 of Set 12 | waitara
Processing Record 7 of Set 12 | kombissiri
Processing Record 8 of Set 12 | sipalay
Processing Record 9 of Set 12 | poronaysk
Processing Record 10 of Set 12 | mersa matruh
Processing Record 11 of Set 12 | tuntum
Processing Record 12 of Set 12 | vangaindrano
Processing Record 13 of Set 12 | mutuali
Processing Record 14 of Set 12 | swan hill
Processing Record 15 of Set 12 | sao felix do xingu
Processing Record 16 of Set 12 | kuta
Processing Record 17 of Set 12 | kapenguria
Processing Record 18 of Set 12 | kununurra
Processing Record 19 of Set 12 | saint-paul
Processing Record 20 of Set 12 | aswan
Processing Record 21 of Set 12 | siwa oasis
Processing Record 22 of Set 12 | santiago del torno
Processing Record 23 of Set 12 | az zubayr
Processing Record 24 of Set 12 | palu
Processing Record 25 of Set 12 | jilin
Processing Record 26 of Set 12 | tosontsengel
Processing Record 27 of Set 12 | dzhankoy
Processing Record 28 of Set 12 | port blair
Processing Record 29 of Set 12 | hvardiiske
Processing Record 30 of Set 12 | hounde
Processing Record 31 of Set 12 | nogliki
Processing Record 32 of Set 12 | nichinan
Processing Record 33 of Set 12 | cuito
Processing Record 34 of Set 12 | pallisa
Processing Record 35 of Set 12 | umluj
Processing Record 36 of Set 12 | nikolayevsk-on-amure
Processing Record 37 of Set 12 | partizansk
Processing Record 38 of Set 12 | marquette
Processing Record 39 of Set 12 | acarau
Processing Record 40 of Set 12 | lubango
Processing Record 41 of Set 12 | bahia de kino
Processing Record 42 of Set 12 | antonio enes
Processing Record 43 of Set 12 | merritt
Processing Record 44 of Set 12 | antofagasta
Processing Record 45 of Set 12 | sadjoavato
City not found. Skipping...
Processing Record 46 of Set 12 | ribnita
Processing Record 47 of Set 12 | isabela
Processing Record 48 of Set 12 | aksaray
Processing Record 49 of Set 12 | kidatu
Processing Record 0 of Set 13 | izluchinsk
Processing Record 1 of Set 13 | plettenberg bay
Processing Record 2 of Set 13 | gondia
Processing Record 3 of Set 13 | beloyarskiy
Processing Record 4 of Set 13 | badr hunayn
Processing Record 5 of Set 13 | sittwe
Processing Record 6 of Set 13 | mutum biyu
Processing Record 7 of Set 13 | camana
Processing Record 8 of Set 13 | marka
```

```
Processing Record 9 of Set 13 | praia
Processing Record 10 of Set 13 | tshikapa
Processing Record 11 of Set 13 | changji
Processing Record 12 of Set 13 | riverton
Processing Record 13 of Set 13 | santa terezinha
Processing Record 14 of Set 13 | nema
Processing Record 15 of Set 13 | copiapo
Processing Record 16 of Set 13 | tromso
Processing Record 17 of Set 13 | bu'aale
Processing Record 18 of Set 13 | gereshk
Processing Record 19 of Set 13 | talara
Processing Record 20 of Set 13 | tyukhtet
Processing Record 21 of Set 13 | betio village
Processing Record 22 of Set 13 | chany
Processing Record 23 of Set 13 | sechura
Processing Record 24 of Set 13 | brenham
Processing Record 25 of Set 13 | howard springs
Processing Record 26 of Set 13 | xining
Processing Record 27 of Set 13 | khorixas
Processing Record 28 of Set 13 | kwang binh
Processing Record 29 of Set 13 | chimore
Processing Record 30 of Set 13 | gustavsberg
Processing Record 31 of Set 13 | mamuju
Processing Record 32 of Set 13 | kolonia town
Processing Record 33 of Set 13 | matoury
-----------------------------
Data Retrieval Complete
-----------------------------
```

In [15]:
```python
# Convert the cities weather data into a Pandas DataFrame
city_data_df =  pd.DataFrame(city_data)

# Show Record Count
city_data_df.count()
```

Out[15]:
```
City          605
Lat           605
Lng           605
Max Temp      605
Humidity      605
Cloudiness    605
Wind Speed    605
Country       605
Date          605
dtype: int64
```

In [11]:
```python
# Display sample data
city_data_df.head()
```

Out[11]:

	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	Date
0	yellowknife	62.4560	-114.3525	46.56	81	54	4.00	CA	1687086391
1	barranca	-10.7500	-77.7667	67.98	82	100	7.54	PE	1687086537
2	myrtle beach	33.6891	-78.8867	70.09	89	0	0.00	US	1687086538
3	bethel	41.3712	-73.4140	63.48	79	100	3.44	US	1687086539
4	grytviken	-54.2811	-36.5092	28.29	68	47	7.11	GS	1687086539

```
In [6]:   # Export the City_Data into a csv
          city_data_df.to_csv("output_data/cities.csv", index_label="City_ID")
```

```
In [7]:   # Read saved data
          city_data_df = pd.read_csv("output_data/cities.csv", index_col="City_ID")

          # Display sample data
          city_data_df.head()
```

Out[7]:

City_ID	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	Date
0	faya	18.3851	42.4509	22.06	35	21	2.60	SA	1666108228
1	farsund	58.0948	6.8047	13.30	100	0	7.65	NO	1666108228
2	new norfolk	-42.7826	147.0587	11.72	58	12	1.34	AU	1666108230
3	jamestown	42.0970	-79.2353	5.77	77	100	9.77	US	1666107934
4	lanzhou	36.0564	103.7922	14.53	48	59	1.20	CN	1666108230

Create the Scatter Plots Requested

Latitude Vs. Temperature

```
In [19]:  # Build scatter plot for latitude vs. temperature


          # Incorporate the other graph properties
          max_temp_lat = city_data_df.plot.scatter("Lat",'Max Temp', edgecolor='black', s=40
          max_temp_lat.set_title("City Latitude vs. Max Temperature (2022-10-18)")
          max_temp_lat.set_ylabel("Max Temperature (F)")
          max_temp_lat.set_xlabel("Latitude")
          max_temp_lat.set_yticks(np.arange(-40, 100, 20))
          max_temp_lat.grid()

          # Save the figure
          plt.savefig("output_data/Fig1.png")

          # Show plot
          plt.show()
```

City Latitude vs. Max Temperature (2022-10-18)
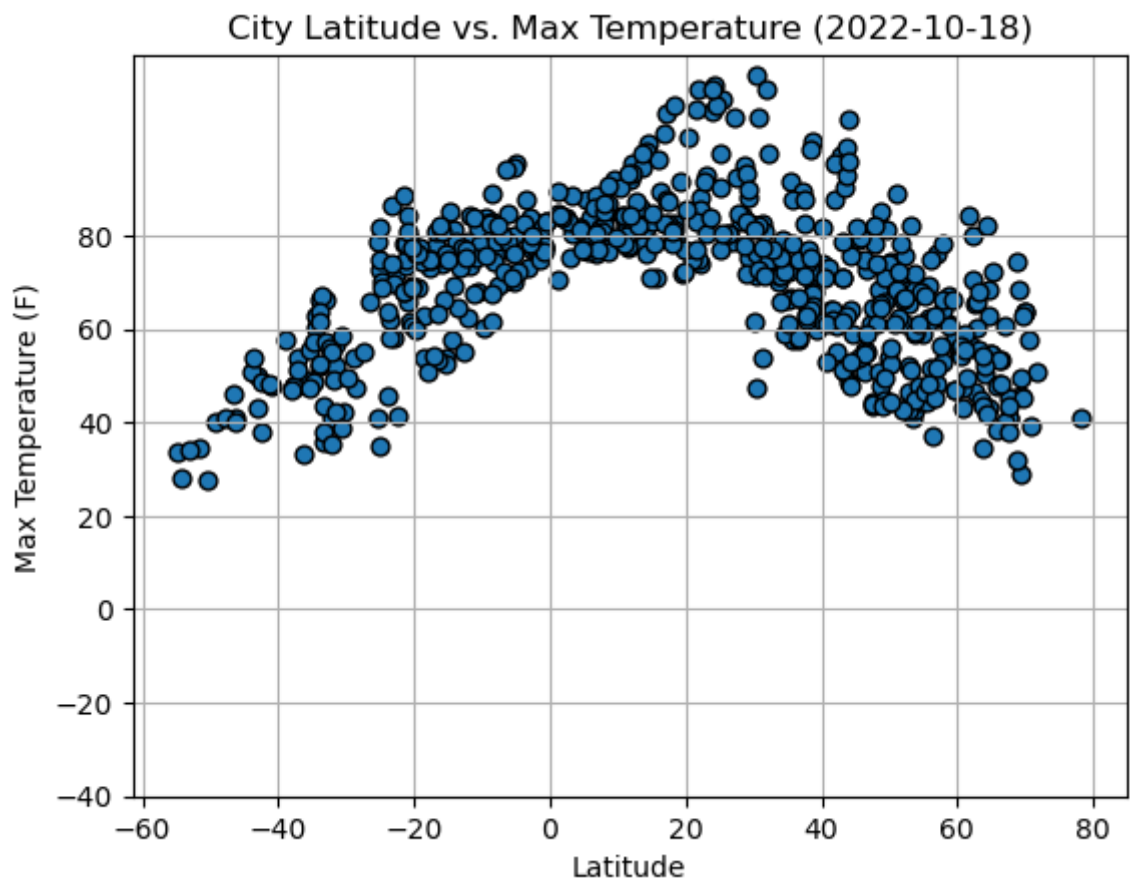
Latitude Vs. Humidity

```
In [22]:  # Build the scatter plots for latitude vs. humidity
          lat_humidity = city_data_df.plot.scatter("Lat", "Humidity", edgecolor='black', s=4(
          lat_humidity.set_title("City Latitude vs. Humidity (2022-10-18)")
          lat_humidity.set_ylabel("Humidity (%)")
          lat_humidity.set_xlabel("Latitude")
          lat_humidity.grid()


          # Save the figure
          plt.savefig("output_data/Fig2.png")

          # Show plot
          plt.show()
```

City Latitude vs. Humidity (2022-10-18)
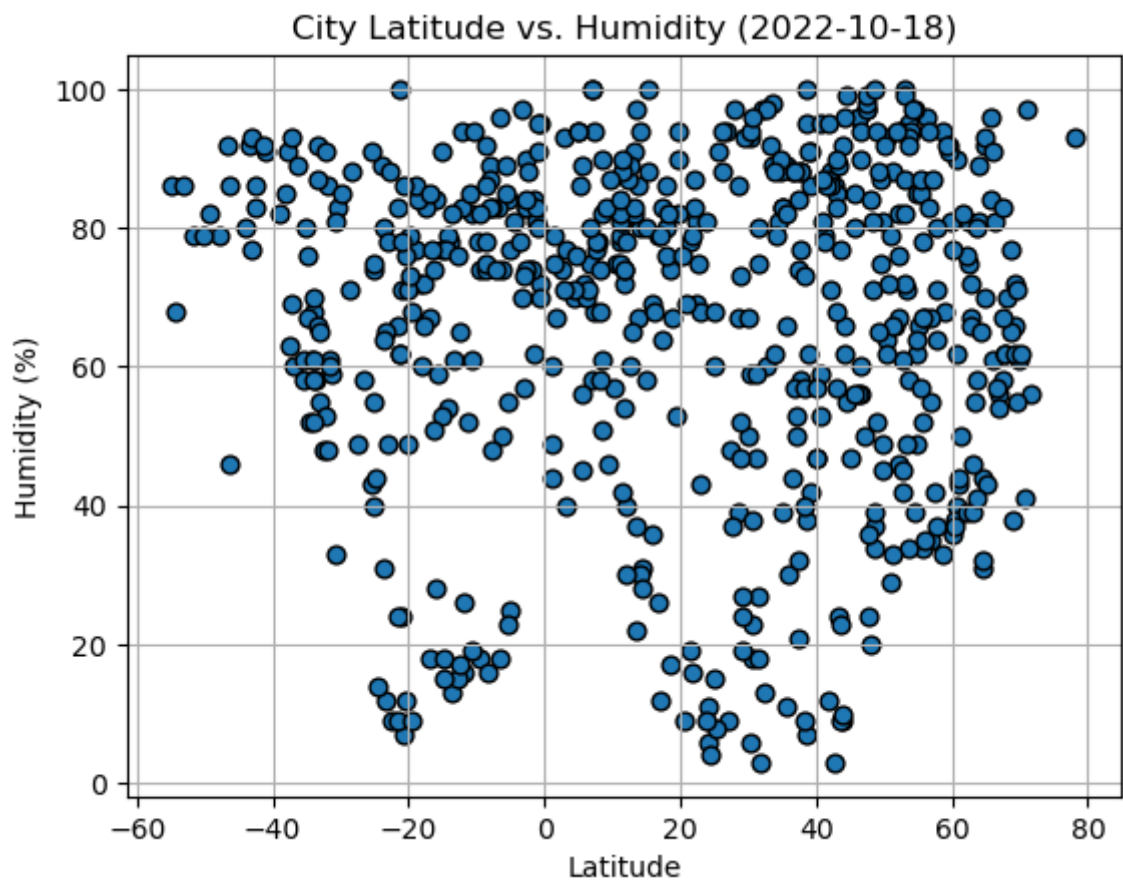
Latitude Vs. Cloudiness

```
In [25]:   # Build the scatter plots for latitude vs. cloudiness

           lat_cloudiness = city_data_df.plot.scatter("Lat","Cloudiness", edgecolor='black',
           lat_cloudiness.set_title("City Latitude vs. Cloudiness (2022-10-18)")
           lat_cloudiness.set_ylabel("Cloudiness (%)")
           lat_cloudiness.set_xlabel("Latitude")
           lat_cloudiness.grid()

           # Save the figure
           plt.savefig("output_data/Fig3.png")

           # Show plot
           plt.show()
```

City Latitude vs. Cloudiness (2022-10-18)
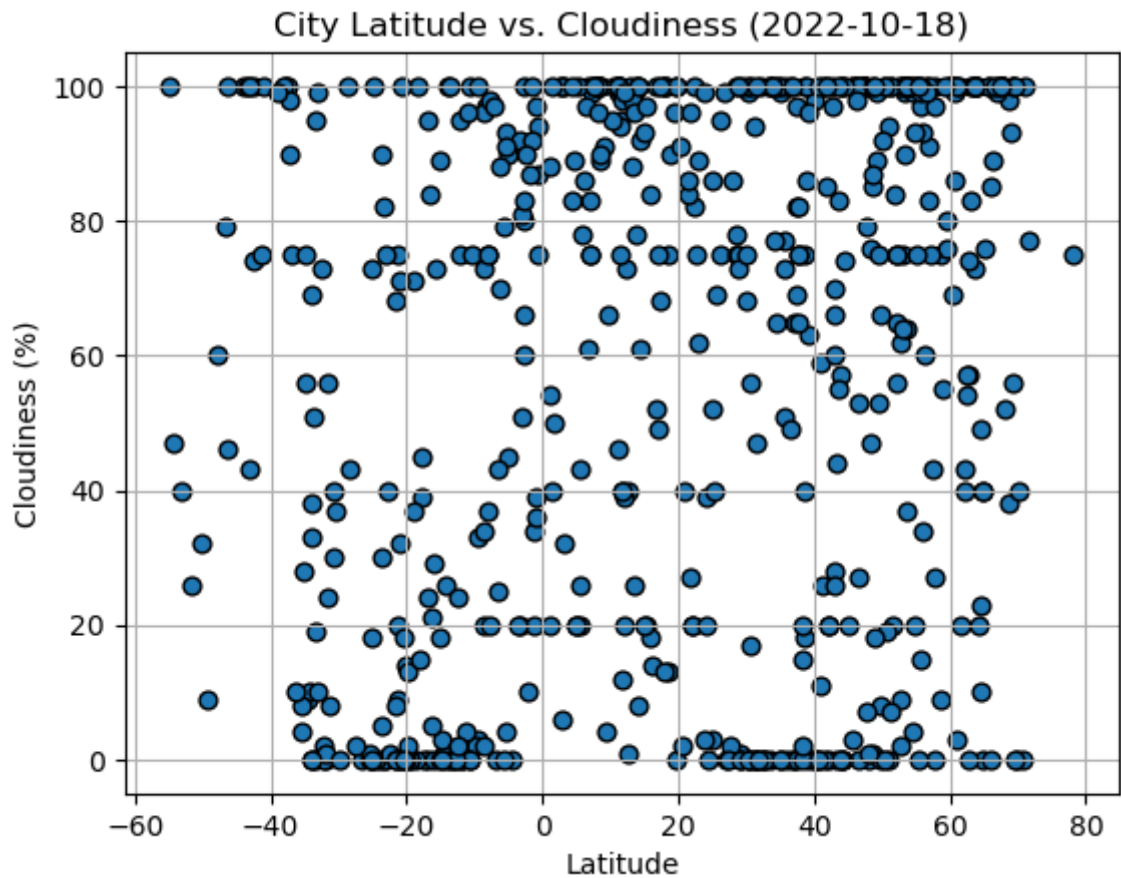
Latitude vs. Wind Speed Plot

```python
In [28]:  # Build the scatter plots for latitude vs. wind speed
          lat_wind_speed = city_data_df.plot.scatter("Lat", "Wind Speed", edgecolor='black',
          lat_wind_speed.set_title("City Latitude vs. Wind Speed (01/06/20)")
          lat_wind_speed.set_ylabel("Wind Speed (mph))")
          lat_wind_speed.set_xlabel("Latitude")
          lat_wind_speed.grid()


          # Save the figure
          plt.savefig("output_data/Fig4.png")

          # Show plot
          plt.show()
```

City Latitude vs. Wind Speed (01/06/20)
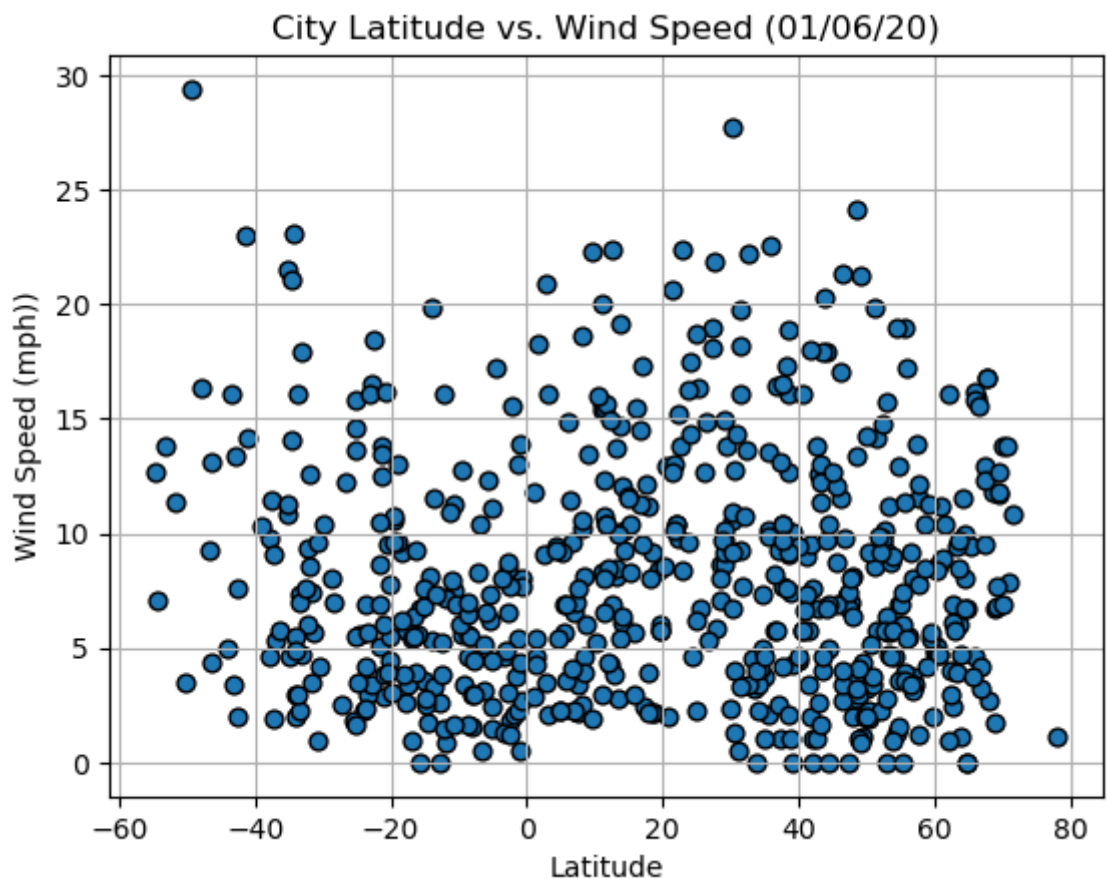
Requirement 2: Compute Linear Regression for Each Relationship

```
In [29]:    # Define a function to create Linear Regression plots
            def lineregress(x,y):
                slope, intercept, rvalue, p_value, std_err =linregress(x, y)
                plt.plot(x, [intercept + slope*val for val in x], 'r')
                print(f"The R-squared is: {rvalue}")
```

```
In [34]:    # Create a DataFrame with the Northern Hemisphere data (Latitude >= 0)
            northern_hemi_df = city_data_df.loc[city_data_df["Lat"]>= 0]
            # Display sample data
            northern_hemi_df.head()
```

Out[34]:

	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	Date
0	yellowknife	62.4560	-114.3525	46.56	81	54	4.00	CA	1687086391
2	myrtle beach	33.6891	-78.8867	70.09	89	0	0.00	US	1687086538
3	bethel	41.3712	-73.4140	63.48	79	100	3.44	US	1687086539
7	yamazakicho-nakabirose	35.0000	134.5500	72.34	83	99	3.76	JP	1687086541
8	qamdo	31.1667	97.2333	54.03	47	94	0.54	CN	1687086541

```
In [35]:   # Create a DataFrame with the Southern Hemisphere data (Latitude < 0)
           southern_hemi_df = city_data_df.loc[city_data_df["Lat"]< 0]
           # Display sample data
           southern_hemi_df.head()
```

Out[35]:

	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	Date
1	barranca	-10.7500	-77.7667	67.98	82	100	7.54	PE	1687086537
4	grytviken	-54.2811	-36.5092	28.29	68	47	7.11	GS	1687086539
5	edinburgh of the seven seas	-37.0676	-12.3116	53.85	60	75	5.35	SH	1687086397
6	arica	-18.4750	-70.3042	62.83	72	100	9.22	CL	1687086540
9	sola	-13.8833	167.5500	78.01	78	100	19.84	VU	1687086542

Temperature vs. Latitude Linear Regression Plot

```
In [40]:   # Linear regression on Northern Hemisphere
           lineregress(northern_hemi_df['Lat'], northern_hemi_df['Max Temp'])
           slope, intercept, rvalue, p_value, std_err =linregress(northern_hemi_df['Lat'], nor
           plt.scatter(northern_hemi_df['Lat'], northern_hemi_df['Max Temp'])
           slope = '{0:,.2f}'.format(slope)
           intercept = '{0:,.2f}'.format(intercept)
           plt.text(0,0,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
           plt.ylabel("Max Temp")
           plt.xlabel("Latitude")
           plt.savefig("north_max_temp.png")
```

The R-squared is: -0.6829470709599784
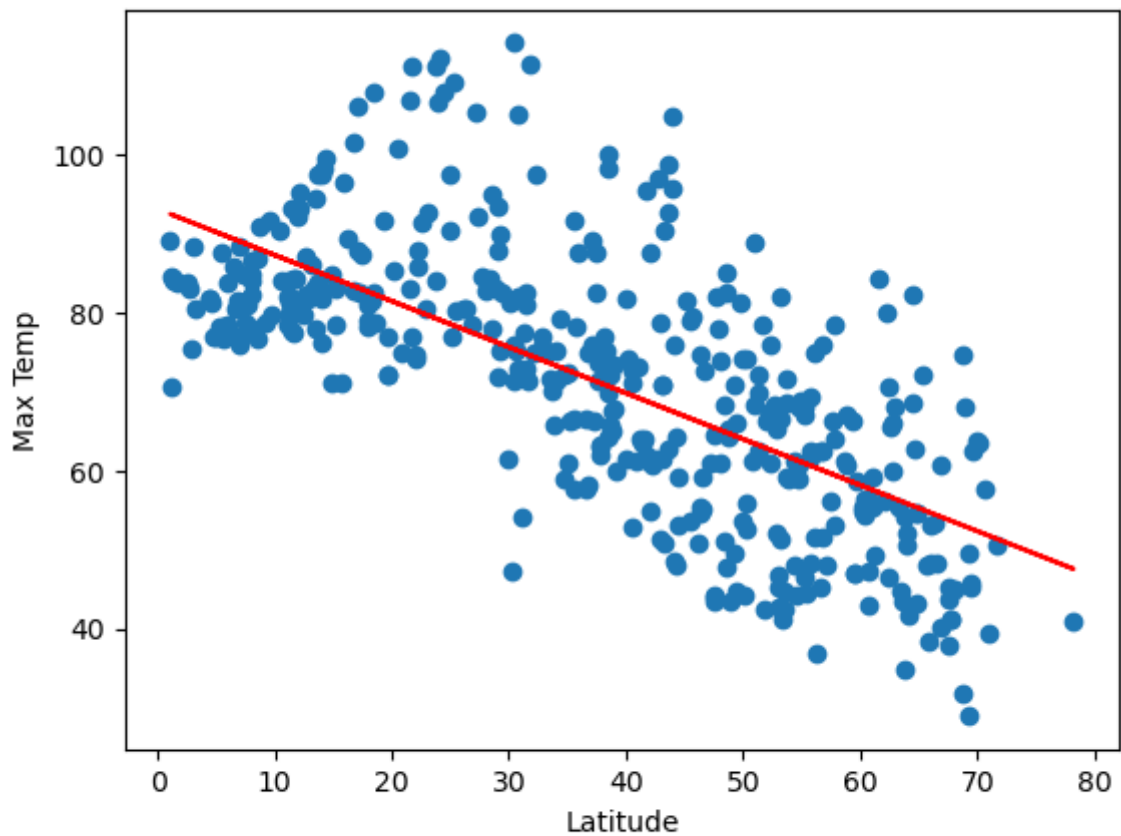
$$y = -0.58x + 93.16$$

In [41]:
```python
# Linear regression on Southern Hemisphere
lineregress(southern_hemi_df['Lat'], southern_hemi_df['Max Temp'])
slope, intercept, rvalue, p_value, std_err =linregress(southern_hemi_df['Lat'], sou
plt.scatter(southern_hemi_df['Lat'], southern_hemi_df['Max Temp'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(-55,35,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Max Temp")
plt.xlabel("Latitude")
plt.savefig("south_max_temp.png")
```

The R-squared is: 0.7952820158504365
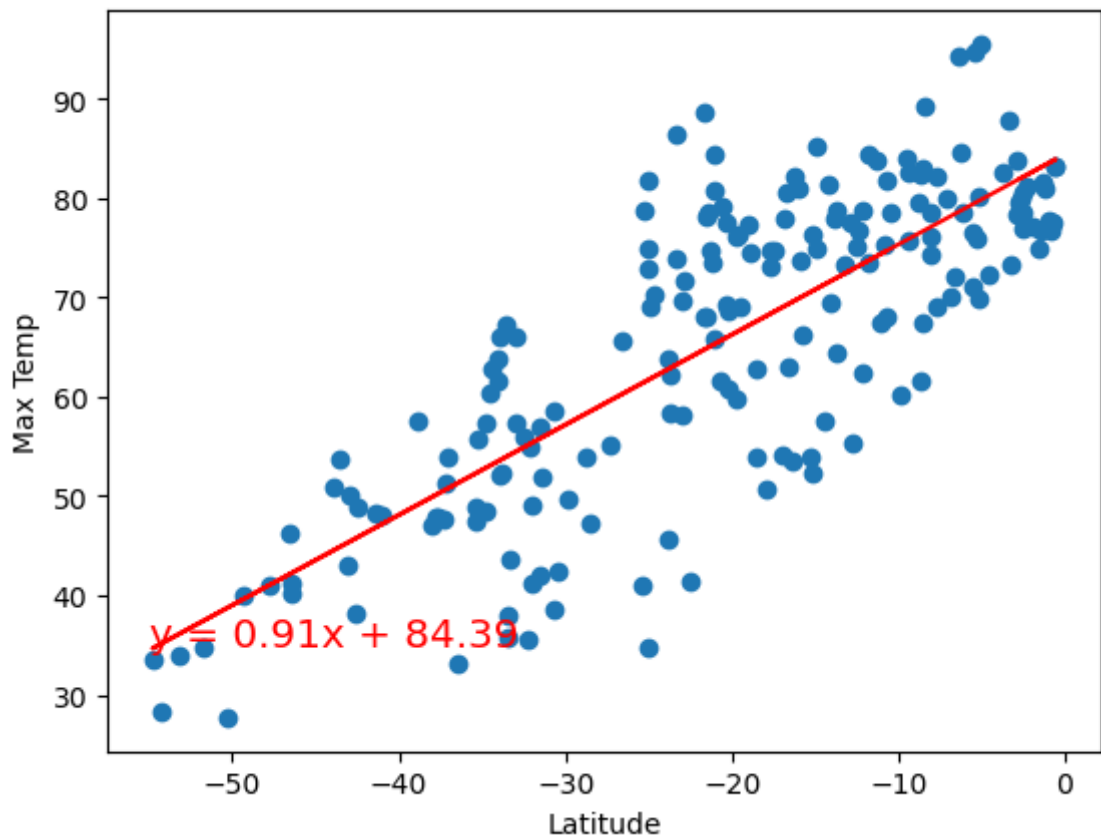
Discussion about the linear relationship:

The linear regression in the northern hemisphere plot above demonstrates that the maximum temperature of the cities decreases as the location of the city becomes further and further from the equator. While the southern hemispher plot demonstrates that the maximum temperature of a city will increase as the location becomes closer to the equator.

Humidity vs. Latitude Linear Regression Plot

In [46]:
```python
# Northern Hemisphere

lineregress(northern_hemi_df['Lat'], northern_hemi_df['Humidity'])
slope, intercept, rvalue, p_value, std_err =linregress(northern_hemi_df['Lat'], no
plt.scatter(northern_hemi_df['Lat'], northern_hemi_df['Humidity'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(40,9,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Humidity")
plt.xlabel("Latitude")
plt.savefig("north_hum.png")
```
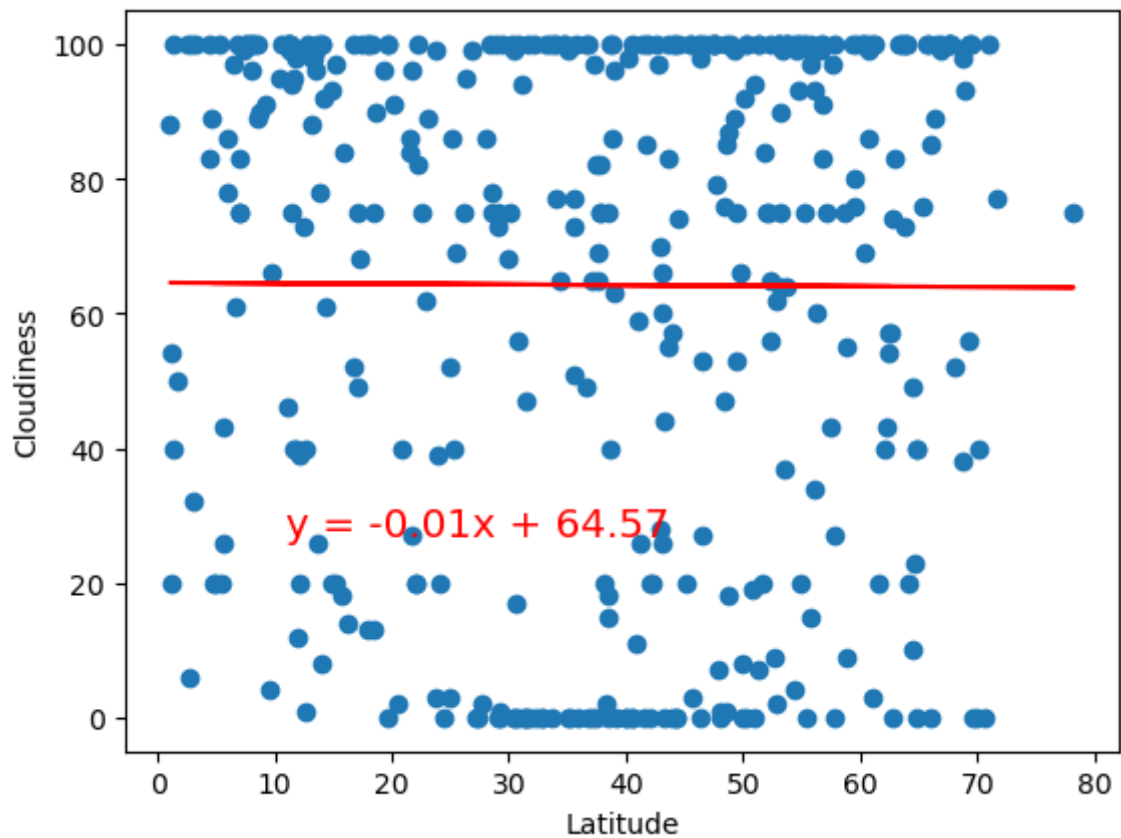
The R-squared is: -0.014739887726158167
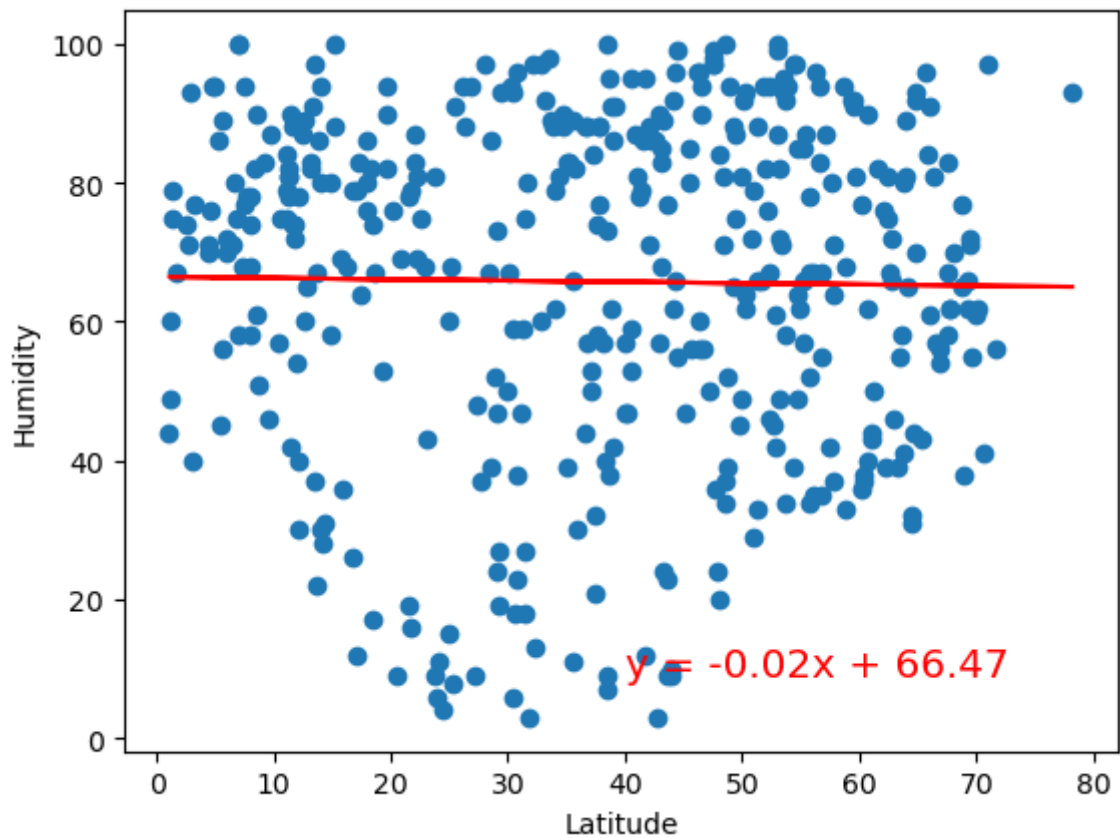
In [47]:
```python
# Southern Hemisphere

lineregress(southern_hemi_df['Lat'], southern_hemi_df['Humidity'])
slope, intercept, rvalue, p_value, std_err =lineregress(southern_hemi_df['Lat'], sou
plt.scatter(southern_hemi_df['Lat'], southern_hemi_df['Humidity'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(-23,18,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Humidity")
plt.xlabel("Latitude")
plt.savefig("south_hum.png")
```

The R-squared is: -0.05790163553635554
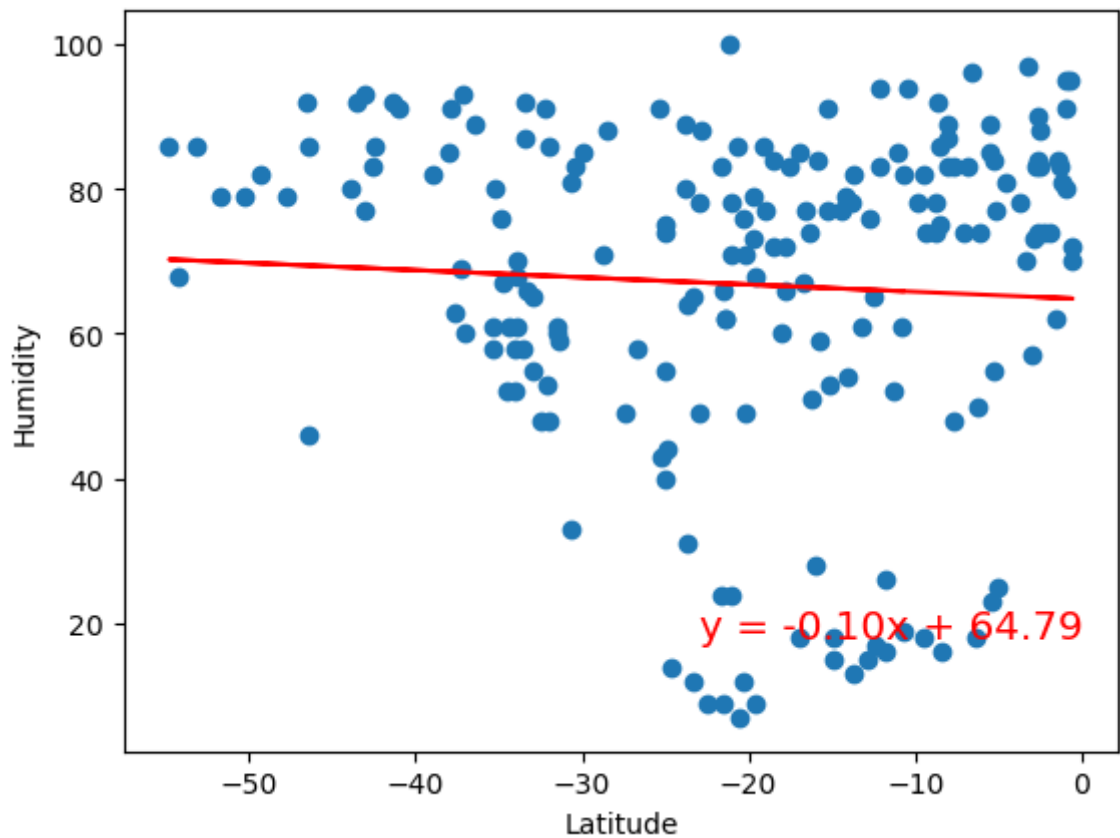
Discussion about the linear relationship:

Both plot depicted a small decline in humidity as they moved southward. Correlation was relatively low in either case. Both depicted the majority of their humidity readings at above 60%

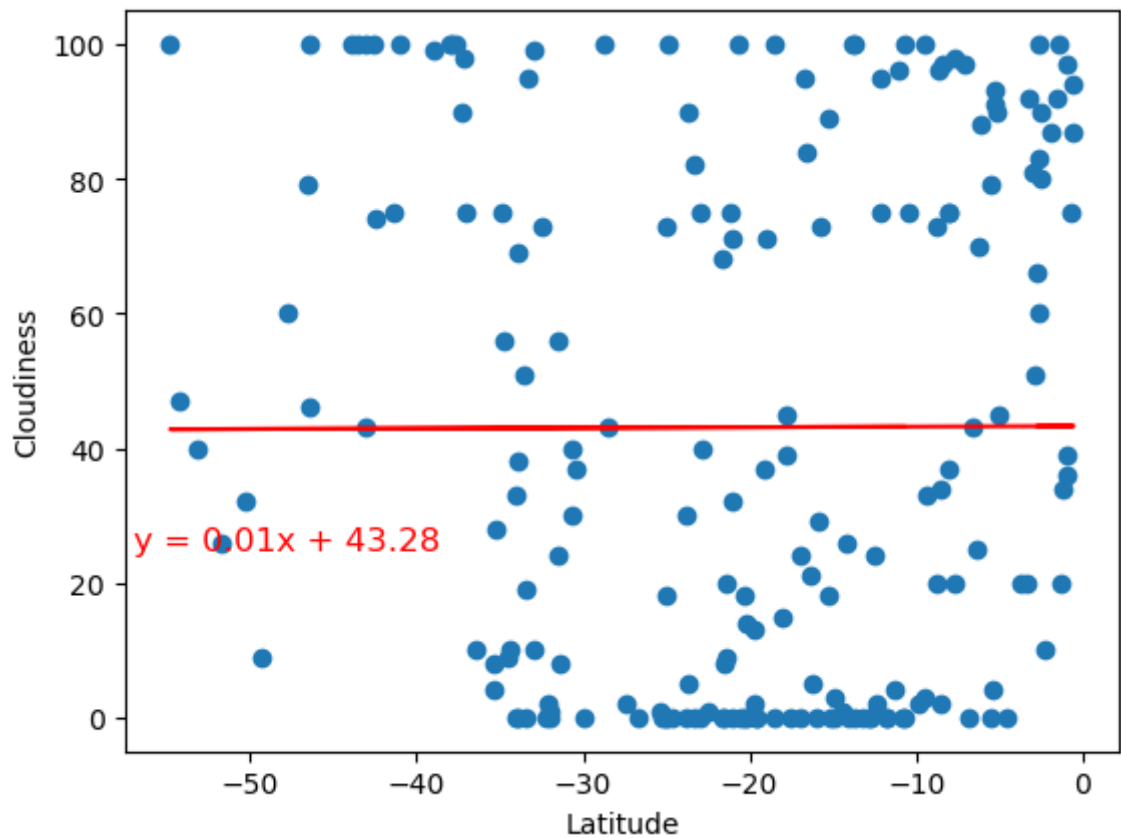## Cloudiness vs. Latitude Linear Regression Plot

In [48]:
```python
# Northern Hemisphere
lineregress(northern_hemi_df['Lat'], northern_hemi_df['Cloudiness'])
slope, intercept, rvalue, p_value, std_err =linregress(northern_hemi_df['Lat'], nor
plt.scatter(northern_hemi_df['Lat'], northern_hemi_df['Cloudiness'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(11,27,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Cloudiness")
plt.xlabel("Latitude")
plt.savefig("north_clouds.png")
```

The R-squared is: -0.004777272748521559

In [49]:
```python
# Southern Hemisphere
lineregress(southern_hemi_df['Lat'], southern_hemi_df['Cloudiness'])
slope, intercept, rvalue, p_value, std_err =linregress(southern_hemi_df['Lat'], sou
plt.scatter(southern_hemi_df['Lat'], southern_hemi_df['Cloudiness'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(-57,25,s=f"y = {slope}x + {intercept}", c='r', size='large')
plt.ylabel("Cloudiness")
plt.xlabel("Latitude")
plt.savefig("south_clouds.png")
```

The R-squared is: 0.0031349272949599974

Discussion about the linear relationship:

Both plot depicted a small rising in cloudiness as they moved northward. Correlation was relatively low in either case. Both depicted a moderate number of complete cloudiness .

Wind Speed vs. Latitude Linear Regression Plot

In [50]:
```python
# Northern Hemisphere
lineregress(northern_hemi_df['Lat'], northern_hemi_df['Wind Speed'])
slope, intercept, rvalue, p_value, std_err =linregress(northern_hemi_df['Lat'], nor
plt.scatter(northern_hemi_df['Lat'], northern_hemi_df['Wind Speed'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(0,40,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Wind Speed")
plt.xlabel("Latitude")
plt.savefig("north_wind.png")
```

The R-squared is: -0.11493420715903271

$y = -0.03x + 9.70$
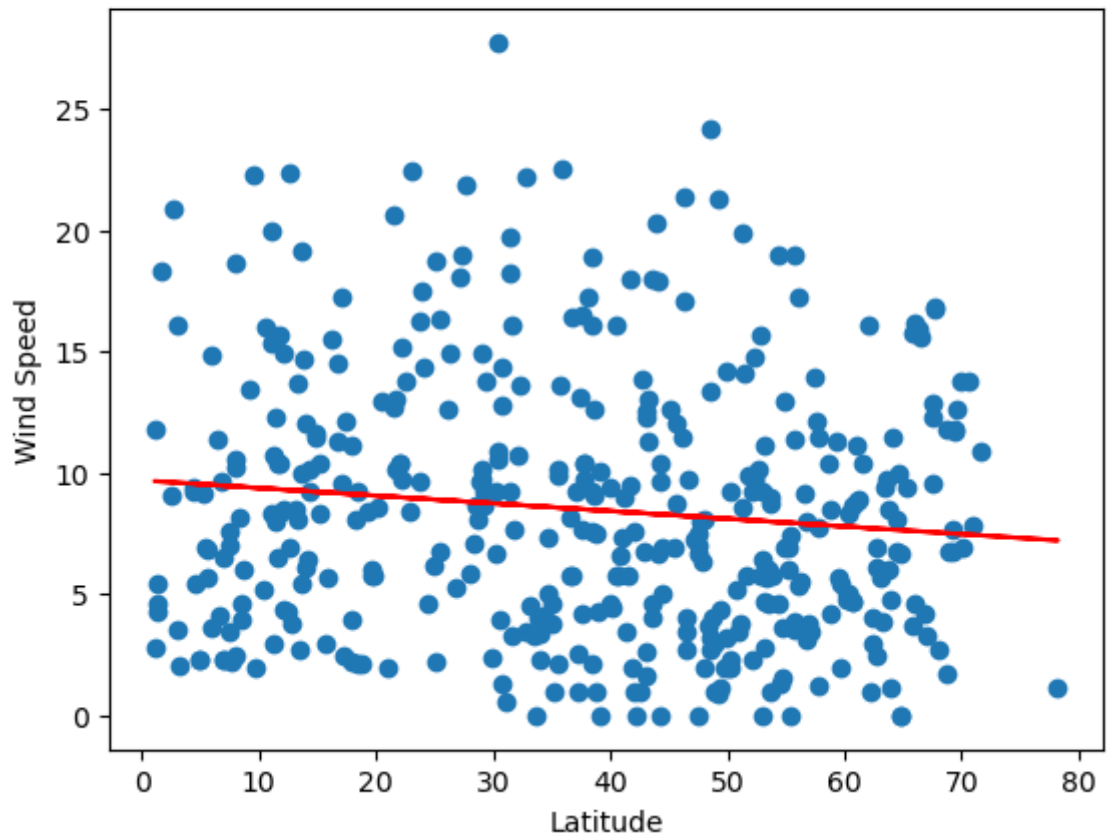
```python
# Southern Hemisphere
lineregress(southern_hemi_df['Lat'], southern_hemi_df['Wind Speed'])
slope, intercept, rvalue, p_value, std_err =linregress(southern_hemi_df['Lat'], sou
plt.scatter(southern_hemi_df['Lat'], southern_hemi_df['Wind Speed'])
slope = '{0:,.2f}'.format(slope)
intercept = '{0:,.2f}'.format(intercept)
plt.text(-25,20,s=f"y = {slope}x + {intercept}", c='r', size='x-large')
plt.ylabel("Wind Speed")
plt.xlabel("Latitude")
plt.savefig("south_wind.png")
```

The R-squared is: -0.3037824019273747
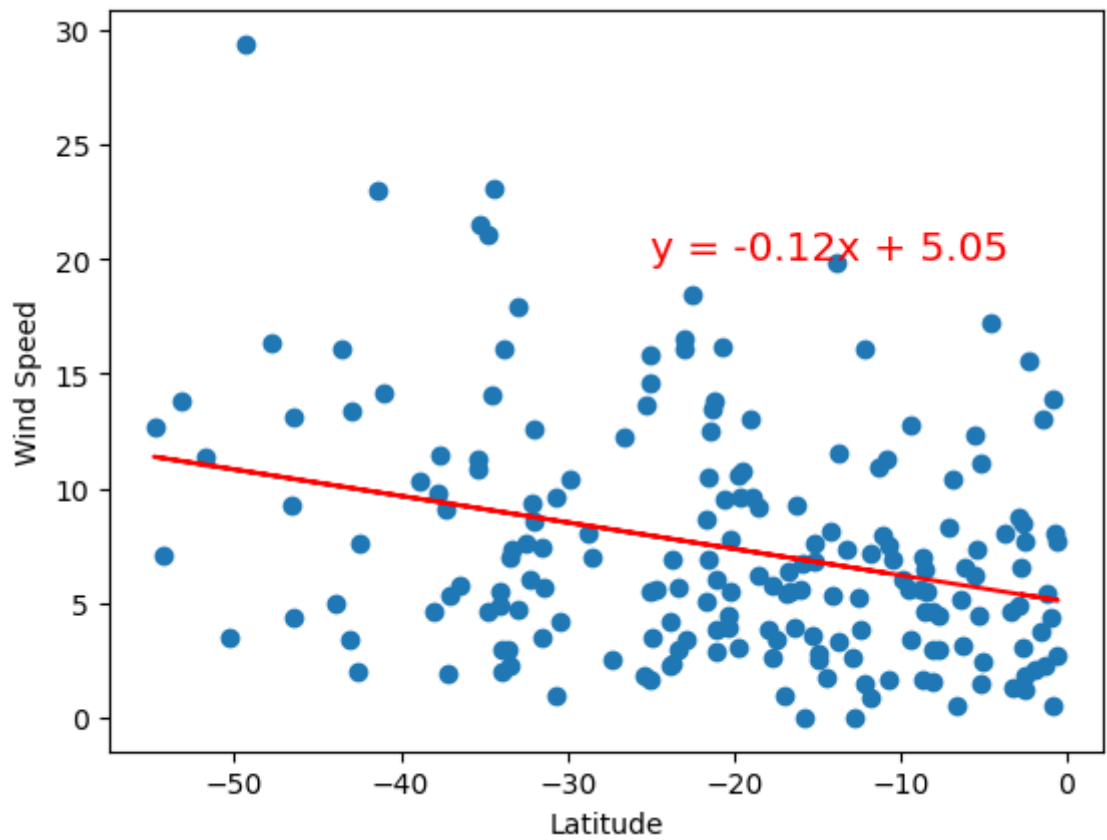
Discussion about the linear relationship:

Both plot depicted a small decline in wind speed as they approached the equator.
Correlation was relatively low in either case. Both depicted the majority of their wind speeds
at under 10.

In [ ]: