WeatherPy

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

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

         # Import 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

```python
In [2]:  # 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: 610

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 [3]:
```python
# Set the API base URL
url = f"http://api.openweathermap.org/data/2.5/weather?units=Metric&APPID={weather_
units = "metric"

# 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"]
```

```python
            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,
                              "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 | bredasdorp
Processing Record 2 of Set 1 | adamstown
Processing Record 3 of Set 1 | iskateley
Processing Record 4 of Set 1 | east london
Processing Record 5 of Set 1 | tiksi
Processing Record 6 of Set 1 | campos belos
Processing Record 7 of Set 1 | port elizabeth
Processing Record 8 of Set 1 | jamestown
Processing Record 9 of Set 1 | blackmans bay
Processing Record 10 of Set 1 | morondava
Processing Record 11 of Set 1 | thompson
Processing Record 12 of Set 1 | gisborne
Processing Record 13 of Set 1 | grytviken
Processing Record 14 of Set 1 | summerside
Processing Record 15 of Set 1 | tolanaro
Processing Record 16 of Set 1 | anna regina
Processing Record 17 of Set 1 | olonkinbyen
Processing Record 18 of Set 1 | lompoc
Processing Record 19 of Set 1 | chonchi
Processing Record 20 of Set 1 | sirjan
Processing Record 21 of Set 1 | margaret river
Processing Record 22 of Set 1 | nova vicosa
Processing Record 23 of Set 1 | yinchuan
Processing Record 24 of Set 1 | albany
Processing Record 25 of Set 1 | port blair
Processing Record 26 of Set 1 | puerto ayora
Processing Record 27 of Set 1 | college
Processing Record 28 of Set 1 | udachny
Processing Record 29 of Set 1 | ubari
Processing Record 30 of Set 1 | edinburgh of the seven seas
Processing Record 31 of Set 1 | ribeira grande
Processing Record 32 of Set 1 | vorgashor
Processing Record 33 of Set 1 | pamandzi
Processing Record 34 of Set 1 | alaghsas
Processing Record 35 of Set 1 | taiohae
City not found. Skipping...
Processing Record 36 of Set 1 | constantia
Processing Record 37 of Set 1 | mount pearl
Processing Record 38 of Set 1 | leava
Processing Record 39 of Set 1 | dalandzadgad
Processing Record 40 of Set 1 | yurga
Processing Record 41 of Set 1 | iqaluit
Processing Record 42 of Set 1 | vilyuchinsk
Processing Record 43 of Set 1 | west island
Processing Record 44 of Set 1 | port-aux-francais
Processing Record 45 of Set 1 | hammerfest
Processing Record 46 of Set 1 | isafjordur
Processing Record 47 of Set 1 | ushuaia
Processing Record 48 of Set 1 | takoradi
Processing Record 49 of Set 1 | kodiak
Processing Record 50 of Set 1 | carutapera
Processing Record 0 of Set 2 | la'ie
Processing Record 1 of Set 2 | yellowknife
Processing Record 2 of Set 2 | tanumah
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Processing Record 3 of Set 2 | fale old settlement
Processing Record 4 of Set 2 | zhangjiakou
Processing Record 5 of Set 2 | hushitai
Processing Record 6 of Set 2 | fort mcmurray
Processing Record 7 of Set 2 | lebu
Processing Record 8 of Set 2 | kapit
Processing Record 9 of Set 2 | st. john's
Processing Record 10 of Set 2 | anadyr
Processing Record 11 of Set 2 | acarau
Processing Record 12 of Set 2 | flying fish cove
Processing Record 13 of Set 2 | bethel
Processing Record 14 of Set 2 | bismarck
Processing Record 15 of Set 2 | mto wa mbu
Processing Record 16 of Set 2 | santa terezinha
Processing Record 17 of Set 2 | rio gallegos
Processing Record 18 of Set 2 | kangding
Processing Record 19 of Set 2 | talnakh
Processing Record 20 of Set 2 | puerto natales
Processing Record 21 of Set 2 | sao jose da coroa grande
Processing Record 22 of Set 2 | waitangi
Processing Record 23 of Set 2 | la mira
Processing Record 24 of Set 2 | bardai
Processing Record 25 of Set 2 | ilulissat
Processing Record 26 of Set 2 | gadzhiyevo
Processing Record 27 of Set 2 | kasongo
Processing Record 28 of Set 2 | alpena
Processing Record 29 of Set 2 | pangody
Processing Record 30 of Set 2 | nemuro
Processing Record 31 of Set 2 | mstera
Processing Record 32 of Set 2 | cueibet
City not found. Skipping...
Processing Record 33 of Set 2 | lihue
Processing Record 34 of Set 2 | cartagena
Processing Record 35 of Set 2 | quatre cocos
Processing Record 36 of Set 2 | port mathurin
Processing Record 37 of Set 2 | nogliki
Processing Record 38 of Set 2 | pangkalan brandan
Processing Record 39 of Set 2 | calvinia
Processing Record 40 of Set 2 | isle of arran
City not found. Skipping...
Processing Record 41 of Set 2 | myronivka
Processing Record 42 of Set 2 | aasiaat
Processing Record 43 of Set 2 | sitka
Processing Record 44 of Set 2 | labrador city
Processing Record 45 of Set 2 | abilene
Processing Record 46 of Set 2 | susuman
Processing Record 47 of Set 2 | boa vista
Processing Record 48 of Set 2 | mongo
Processing Record 49 of Set 2 | sechura
Processing Record 0 of Set 3 | laguna
Processing Record 1 of Set 3 | chibougamau
Processing Record 2 of Set 3 | badger
Processing Record 3 of Set 3 | miranda do douro
Processing Record 4 of Set 3 | hermanus
Processing Record 5 of Set 3 | wailua homesteads
Processing Record 6 of Set 3 | porbandar
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Processing Record 7 of Set 3 | balabac
Processing Record 8 of Set 3 | laikit, laikit ii (dimembe)
Processing Record 9 of Set 3 | san luis de la loma
Processing Record 10 of Set 3 | renon - ritten
Processing Record 11 of Set 3 | fort st. john
Processing Record 12 of Set 3 | san antonio de pale
Processing Record 13 of Set 3 | whitehorse
Processing Record 14 of Set 3 | port isabel
Processing Record 15 of Set 3 | rio grande
Processing Record 16 of Set 3 | kristiansund
Processing Record 17 of Set 3 | klyuchi
Processing Record 18 of Set 3 | punta arenas
Processing Record 19 of Set 3 | port sudan
Processing Record 20 of Set 3 | holma
Processing Record 21 of Set 3 | pangoa
Processing Record 22 of Set 3 | longyearbyen
Processing Record 23 of Set 3 | hamilton
Processing Record 24 of Set 3 | jabal os saraj
Processing Record 25 of Set 3 | katsuura
Processing Record 26 of Set 3 | kayangel
Processing Record 27 of Set 3 | formosa
Processing Record 28 of Set 3 | qandala
Processing Record 29 of Set 3 | keflavik
Processing Record 30 of Set 3 | cabo san lucas
Processing Record 31 of Set 3 | brisas de zicatela
Processing Record 32 of Set 3 | al badari
Processing Record 33 of Set 3 | parnamirim
Processing Record 34 of Set 3 | roma
Processing Record 35 of Set 3 | ca mau
Processing Record 36 of Set 3 | enewetak
Processing Record 37 of Set 3 | nova sintra
Processing Record 38 of Set 3 | ta'izz
Processing Record 39 of Set 3 | petropavlovsk-kamchatsky
Processing Record 40 of Set 3 | codrington
Processing Record 41 of Set 3 | invercargill
Processing Record 42 of Set 3 | howard springs
Processing Record 43 of Set 3 | bulgan
Processing Record 44 of Set 3 | uturoa
Processing Record 45 of Set 3 | figuig (centre)
Processing Record 46 of Set 3 | taltal
Processing Record 47 of Set 3 | holualoa
Processing Record 48 of Set 3 | namibe
Processing Record 49 of Set 3 | papatowai
Processing Record 0 of Set 4 | utrik
Processing Record 1 of Set 4 | nuuk
Processing Record 2 of Set 4 | trindade
Processing Record 3 of Set 4 | salekhard
Processing Record 4 of Set 4 | talitsa
Processing Record 5 of Set 4 | kuta
Processing Record 6 of Set 4 | borogontsy
Processing Record 7 of Set 4 | cill airne
Processing Record 8 of Set 4 | payyannur
Processing Record 9 of Set 4 | pandan
Processing Record 10 of Set 4 | georgetown
Processing Record 11 of Set 4 | jinka
Processing Record 12 of Set 4 | kijang
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Processing Record 13 of Set 4 | afaahiti
Processing Record 14 of Set 4 | dauphin
Processing Record 15 of Set 4 | bouza
Processing Record 16 of Set 4 | zima
Processing Record 17 of Set 4 | yanbu
Processing Record 18 of Set 4 | langtang
Processing Record 19 of Set 4 | nagqu
Processing Record 20 of Set 4 | axim
Processing Record 21 of Set 4 | egilsstadir
Processing Record 22 of Set 4 | gizo
Processing Record 23 of Set 4 | qaqortoq
Processing Record 24 of Set 4 | montepuez
Processing Record 25 of Set 4 | bontang
Processing Record 26 of Set 4 | xai-xai
Processing Record 27 of Set 4 | klobuck
Processing Record 28 of Set 4 | san ignacio rio muerto
Processing Record 29 of Set 4 | arraias
Processing Record 30 of Set 4 | sinabang
Processing Record 31 of Set 4 | south hedland
Processing Record 32 of Set 4 | nyrob
Processing Record 33 of Set 4 | ruthin
Processing Record 34 of Set 4 | remire-montjoly
Processing Record 35 of Set 4 | tokmok
Processing Record 36 of Set 4 | sangsong-ni
Processing Record 37 of Set 4 | um jar al gharbiyya
Processing Record 38 of Set 4 | tovarkovo
Processing Record 39 of Set 4 | argo
Processing Record 40 of Set 4 | amga
Processing Record 41 of Set 4 | akureyri
Processing Record 42 of Set 4 | bilibino
Processing Record 43 of Set 4 | twin falls
Processing Record 44 of Set 4 | manfalut
Processing Record 45 of Set 4 | kahror pakka
Processing Record 46 of Set 4 | villa ojo de agua
Processing Record 47 of Set 4 | sur
Processing Record 48 of Set 4 | avarua
Processing Record 49 of Set 4 | alice springs
Processing Record 0 of Set 5 | lazaro cardenas
Processing Record 1 of Set 5 | vorkuta
Processing Record 2 of Set 5 | rajapur
Processing Record 3 of Set 5 | polyarnyy
Processing Record 4 of Set 5 | gornyye klyuchi
Processing Record 5 of Set 5 | beira
Processing Record 6 of Set 5 | edam
Processing Record 7 of Set 5 | kudymkar
Processing Record 8 of Set 5 | embarcacion
Processing Record 9 of Set 5 | kingston
Processing Record 10 of Set 5 | cargados carajos
City not found. Skipping...
Processing Record 11 of Set 5 | bato
Processing Record 12 of Set 5 | willowmore
Processing Record 13 of Set 5 | portland
Processing Record 14 of Set 5 | coronel du graty
Processing Record 15 of Set 5 | faya-largeau
Processing Record 16 of Set 5 | coquimbo
Processing Record 17 of Set 5 | springbok
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Processing Record 18 of Set 5 | luderitz
Processing Record 19 of Set 5 | la rinconada
Processing Record 20 of Set 5 | itoman
Processing Record 21 of Set 5 | vershino-darasunskiy
Processing Record 22 of Set 5 | berezovskiy
Processing Record 23 of Set 5 | atafu village
Processing Record 24 of Set 5 | tual
Processing Record 25 of Set 5 | poronaysk
Processing Record 26 of Set 5 | stanley
Processing Record 27 of Set 5 | kohlu
Processing Record 28 of Set 5 | al mijlad
Processing Record 29 of Set 5 | parang
Processing Record 30 of Set 5 | timbuktu
Processing Record 31 of Set 5 | anloga
Processing Record 32 of Set 5 | ancud
Processing Record 33 of Set 5 | sao tome
Processing Record 34 of Set 5 | 'ohonua
City not found. Skipping...
Processing Record 35 of Set 5 | luorong
Processing Record 36 of Set 5 | pisco
Processing Record 37 of Set 5 | saratamata
City not found. Skipping...
Processing Record 38 of Set 5 | semey
Processing Record 39 of Set 5 | ulsteinvik
Processing Record 40 of Set 5 | chernyshevskiy
Processing Record 41 of Set 5 | aykhal
Processing Record 42 of Set 5 | yelan'
Processing Record 43 of Set 5 | morehead city
Processing Record 44 of Set 5 | angaur state
Processing Record 45 of Set 5 | marsh harbour
Processing Record 46 of Set 5 | manacapuru
Processing Record 47 of Set 5 | ust-nera
Processing Record 48 of Set 5 | hawaiian paradise park
Processing Record 49 of Set 5 | ghat
Processing Record 0 of Set 6 | tsiombe
Processing Record 1 of Set 6 | carnarvon
Processing Record 2 of Set 6 | zunyi
Processing Record 3 of Set 6 | bandundu
Processing Record 4 of Set 6 | suihua
Processing Record 5 of Set 6 | sydney
Processing Record 6 of Set 6 | sabang
Processing Record 7 of Set 6 | vilyuysk
Processing Record 8 of Set 6 | asau
Processing Record 9 of Set 6 | ivdel'
Processing Record 10 of Set 6 | san jose de las lajas
Processing Record 11 of Set 6 | salinopolis
Processing Record 12 of Set 6 | parkville
Processing Record 13 of Set 6 | taizhou
Processing Record 14 of Set 6 | murud
Processing Record 15 of Set 6 | srandakan
Processing Record 16 of Set 6 | kodinsk
Processing Record 17 of Set 6 | kenai
Processing Record 18 of Set 6 | mersrags
Processing Record 19 of Set 6 | sosnovo-ozerskoye
Processing Record 20 of Set 6 | nabire
Processing Record 21 of Set 6 | san patricio
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Processing Record 22 of Set 6 | illizi
Processing Record 23 of Set 6 | ust'-ilimsk
Processing Record 24 of Set 6 | shiqi
Processing Record 25 of Set 6 | newman
Processing Record 26 of Set 6 | pervomayskoye
Processing Record 27 of Set 6 | elmendorf air force base
City not found. Skipping...
Processing Record 28 of Set 6 | praia da vitoria
Processing Record 29 of Set 6 | am djarass
City not found. Skipping...
Processing Record 30 of Set 6 | saldanha
Processing Record 31 of Set 6 | yuzhno-kurilsk
Processing Record 32 of Set 6 | el calafate
Processing Record 33 of Set 6 | zlatna
Processing Record 34 of Set 6 | morro bay
Processing Record 35 of Set 6 | lensk
Processing Record 36 of Set 6 | twon-brass
Processing Record 37 of Set 6 | les cayes
Processing Record 38 of Set 6 | luwuk
Processing Record 39 of Set 6 | port shepstone
Processing Record 40 of Set 6 | crane
Processing Record 41 of Set 6 | usogorsk
Processing Record 42 of Set 6 | glace bay
Processing Record 43 of Set 6 | afif
Processing Record 44 of Set 6 | suoyarvi
Processing Record 45 of Set 6 | nikolayevsk-on-amure
Processing Record 46 of Set 6 | margate
Processing Record 47 of Set 6 | glendive
Processing Record 48 of Set 6 | ampanihy
Processing Record 49 of Set 6 | happy valley-goose bay
Processing Record 0 of Set 7 | embrun
Processing Record 1 of Set 7 | zaranj
Processing Record 2 of Set 7 | balqash
Processing Record 3 of Set 7 | pirot
Processing Record 4 of Set 7 | callao
Processing Record 5 of Set 7 | kataragama
City not found. Skipping...
Processing Record 6 of Set 7 | mpika
Processing Record 7 of Set 7 | kerikeri
Processing Record 8 of Set 7 | collie
Processing Record 9 of Set 7 | kalmunai
Processing Record 10 of Set 7 | sisimiut
Processing Record 11 of Set 7 | khandyga
Processing Record 12 of Set 7 | asau village
City not found. Skipping...
Processing Record 13 of Set 7 | tura
Processing Record 14 of Set 7 | wynyard
Processing Record 15 of Set 7 | mount isa
Processing Record 16 of Set 7 | port lincoln
Processing Record 17 of Set 7 | bodaybo
Processing Record 18 of Set 7 | simanggang
Processing Record 19 of Set 7 | marrakesh
Processing Record 20 of Set 7 | lidzbark warminski
Processing Record 21 of Set 7 | castillos
Processing Record 22 of Set 7 | santa ana
Processing Record 23 of Set 7 | kideksha
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Processing Record 24 of Set 7 | cervantes
Processing Record 25 of Set 7 | aberdeen
Processing Record 26 of Set 7 | vingt cinq
City not found. Skipping...
Processing Record 27 of Set 7 | floro
Processing Record 28 of Set 7 | mildura
Processing Record 29 of Set 7 | trujillo
Processing Record 30 of Set 7 | berdigestyakh
Processing Record 31 of Set 7 | nelson bay
Processing Record 32 of Set 7 | naze
Processing Record 33 of Set 7 | ebon
Processing Record 34 of Set 7 | port alfred
Processing Record 35 of Set 7 | hotan
Processing Record 36 of Set 7 | north shore
Processing Record 37 of Set 7 | rengasdengklok
Processing Record 38 of Set 7 | raton
Processing Record 39 of Set 7 | auki
Processing Record 40 of Set 7 | lorengau
Processing Record 41 of Set 7 | new norfolk
Processing Record 42 of Set 7 | paita
Processing Record 43 of Set 7 | el triunfo
Processing Record 44 of Set 7 | mtambile
Processing Record 45 of Set 7 | saipan
Processing Record 46 of Set 7 | korla
Processing Record 47 of Set 7 | touros
Processing Record 48 of Set 7 | ocean shores
Processing Record 49 of Set 7 | san sebastian de la gomera
Processing Record 0 of Set 8 | yatou
Processing Record 1 of Set 8 | laojunmiao
Processing Record 2 of Set 8 | tazovsky
Processing Record 3 of Set 8 | conde
Processing Record 4 of Set 8 | nacala
Processing Record 5 of Set 8 | san antonio del estrecho
City not found. Skipping...
Processing Record 6 of Set 8 | galle
Processing Record 7 of Set 8 | muzayri'
City not found. Skipping...
Processing Record 8 of Set 8 | greenville
Processing Record 9 of Set 8 | mukah
City not found. Skipping...
Processing Record 10 of Set 8 | hasaki
Processing Record 11 of Set 8 | munford
Processing Record 12 of Set 8 | talara
Processing Record 13 of Set 8 | vadso
Processing Record 14 of Set 8 | puerto san carlos
City not found. Skipping...
Processing Record 15 of Set 8 | kez
Processing Record 16 of Set 8 | quzhou
Processing Record 17 of Set 8 | damghan
Processing Record 18 of Set 8 | gulf shores
Processing Record 19 of Set 8 | road town
Processing Record 20 of Set 8 | midvagur
Processing Record 21 of Set 8 | emerald
Processing Record 22 of Set 8 | santanyi
Processing Record 23 of Set 8 | leh
Processing Record 24 of Set 8 | igarka
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Processing Record 25 of Set 8 | merizo village
Processing Record 26 of Set 8 | sarapul
Processing Record 27 of Set 8 | rabaul
Processing Record 28 of Set 8 | quellon
Processing Record 29 of Set 8 | colonia
Processing Record 30 of Set 8 | karkira
Processing Record 31 of Set 8 | mazatlan
Processing Record 32 of Set 8 | santiago de compostela
Processing Record 33 of Set 8 | ola
Processing Record 34 of Set 8 | swift current
Processing Record 35 of Set 8 | palikir - national government center
Processing Record 36 of Set 8 | weno
Processing Record 37 of Set 8 | nikel
Processing Record 38 of Set 8 | bodo
Processing Record 39 of Set 8 | ratnagiri
Processing Record 40 of Set 8 | tocache
Processing Record 41 of Set 8 | tchintabaraden
Processing Record 42 of Set 8 | timmins
Processing Record 43 of Set 8 | papao
Processing Record 44 of Set 8 | palmer
Processing Record 45 of Set 8 | beyneu
Processing Record 46 of Set 8 | galesong
Processing Record 47 of Set 8 | kismayo
Processing Record 48 of Set 8 | mazara del vallo
Processing Record 49 of Set 8 | strelka
Processing Record 0 of Set 9 | ayr
Processing Record 1 of Set 9 | lillehammer
Processing Record 2 of Set 9 | belogradchik
Processing Record 3 of Set 9 | minot
Processing Record 4 of Set 9 | selfoss
Processing Record 5 of Set 9 | kone
Processing Record 6 of Set 9 | turabah
Processing Record 7 of Set 9 | constitucion
Processing Record 8 of Set 9 | olyokminsk
Processing Record 9 of Set 9 | darwin
Processing Record 10 of Set 9 | aghstafa
Processing Record 11 of Set 9 | eydhafushi
Processing Record 12 of Set 9 | al ghayzah
Processing Record 13 of Set 9 | kailua-kona
Processing Record 14 of Set 9 | arawa
Processing Record 15 of Set 9 | marsa alam
Processing Record 16 of Set 9 | kiruna
Processing Record 17 of Set 9 | lake city
Processing Record 18 of Set 9 | hayma'
City not found. Skipping...
Processing Record 19 of Set 9 | lock haven
Processing Record 20 of Set 9 | neelankarai
Processing Record 21 of Set 9 | al kharijah
Processing Record 22 of Set 9 | covilha
Processing Record 23 of Set 9 | luganville
Processing Record 24 of Set 9 | sao paulo de olivenca
Processing Record 25 of Set 9 | tshabong
Processing Record 26 of Set 9 | praia
Processing Record 27 of Set 9 | iwanai
Processing Record 28 of Set 9 | gorodets
Processing Record 29 of Set 9 | kirakira
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Processing Record 30 of Set 9 | yashkul'
Processing Record 31 of Set 9 | labytnangi
Processing Record 32 of Set 9 | avanigadda
Processing Record 33 of Set 9 | scarborough
Processing Record 34 of Set 9 | palitana
Processing Record 35 of Set 9 | tamanrasset
Processing Record 36 of Set 9 | dudinka
Processing Record 37 of Set 9 | nueva gerona
Processing Record 38 of Set 9 | vila velha
Processing Record 39 of Set 9 | sarrat
Processing Record 40 of Set 9 | marquette
Processing Record 41 of Set 9 | magadan
Processing Record 42 of Set 9 | kavieng
Processing Record 43 of Set 9 | rocha
Processing Record 44 of Set 9 | tyukalinsk
Processing Record 45 of Set 9 | espargos
City not found. Skipping...
Processing Record 46 of Set 9 | ta`u
Processing Record 47 of Set 9 | hats'avan
Processing Record 48 of Set 9 | babu
Processing Record 49 of Set 9 | saint-philippe
Processing Record 0 of Set 10 | sonsorol village
City not found. Skipping...
Processing Record 1 of Set 10 | caleta de carquin
Processing Record 2 of Set 10 | bandarbeyla
Processing Record 3 of Set 10 | buta
Processing Record 4 of Set 10 | bydgoszcz
Processing Record 5 of Set 10 | mount gambier
Processing Record 6 of Set 10 | manaure
Processing Record 7 of Set 10 | machico
Processing Record 8 of Set 10 | nar'yan-mar
Processing Record 9 of Set 10 | isola di capo rizzuto
Processing Record 10 of Set 10 | khorixas
Processing Record 11 of Set 10 | bechar
Processing Record 12 of Set 10 | muroto-misakicho
Processing Record 13 of Set 10 | bugana
Processing Record 14 of Set 10 | west bay
Processing Record 15 of Set 10 | cumana
Processing Record 16 of Set 10 | kili
Processing Record 17 of Set 10 | alofi
Processing Record 18 of Set 10 | harper
Processing Record 19 of Set 10 | severo-yeniseyskiy
Processing Record 20 of Set 10 | phongsali
Processing Record 21 of Set 10 | marshall
Processing Record 22 of Set 10 | tevragh zeina
City not found. Skipping...
Processing Record 23 of Set 10 | thinadhoo
Processing Record 24 of Set 10 | mili
Processing Record 25 of Set 10 | mpulungu
Processing Record 26 of Set 10 | mao
Processing Record 27 of Set 10 | dondukovskaya
Processing Record 28 of Set 10 | al burayqah
Processing Record 29 of Set 10 | mayya
Processing Record 30 of Set 10 | toktogul
Processing Record 31 of Set 10 | tauste
Processing Record 32 of Set 10 | sola
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Processing Record 33 of Set 10 | diawara
Processing Record 34 of Set 10 | alibag
Processing Record 35 of Set 10 | fuvahmulah
City not found. Skipping...
Processing Record 36 of Set 10 | broome
Processing Record 37 of Set 10 | essaouira
Processing Record 38 of Set 10 | minab
Processing Record 39 of Set 10 | labuan
Processing Record 40 of Set 10 | rongelap
Processing Record 41 of Set 10 | howrah
Processing Record 42 of Set 10 | horta
Processing Record 43 of Set 10 | yutz
Processing Record 44 of Set 10 | long beach
Processing Record 45 of Set 10 | randudongkal
Processing Record 46 of Set 10 | rikaze
Processing Record 47 of Set 10 | zarate
Processing Record 48 of Set 10 | arraial do cabo
Processing Record 49 of Set 10 | nieuw amsterdam
Processing Record 0 of Set 11 | island harbour
Processing Record 1 of Set 11 | belmonte
Processing Record 2 of Set 11 | salinas
Processing Record 3 of Set 11 | kinablangan
Processing Record 4 of Set 11 | parauna
Processing Record 5 of Set 11 | viedma
Processing Record 6 of Set 11 | chunskiy
Processing Record 7 of Set 11 | le lavandou
Processing Record 8 of Set 11 | altai
Processing Record 9 of Set 11 | kabalo
Processing Record 10 of Set 11 | neyshabur
Processing Record 11 of Set 11 | geraldton
Processing Record 12 of Set 11 | nchelenge
Processing Record 13 of Set 11 | randers
Processing Record 14 of Set 11 | kyzyl-suu
Processing Record 15 of Set 11 | shalya
Processing Record 16 of Set 11 | tobi village
City not found. Skipping...
Processing Record 17 of Set 11 | kerema
Processing Record 18 of Set 11 | mogocha
Processing Record 19 of Set 11 | saline
Processing Record 20 of Set 11 | dapaong
Processing Record 21 of Set 11 | i-n-salah
Processing Record 22 of Set 11 | mezhdurechenskiy
Processing Record 23 of Set 11 | kuwait city
Processing Record 24 of Set 11 | kamensk-ural'skiy
Processing Record 25 of Set 11 | hagere hiywet
Processing Record 26 of Set 11 | cananea
Processing Record 27 of Set 11 | taksimo
Processing Record 28 of Set 11 | fort meade
Processing Record 29 of Set 11 | laayoune plage
City not found. Skipping...
Processing Record 30 of Set 11 | puerto baquerizo moreno
Processing Record 31 of Set 11 | nieuw nickerie
Processing Record 32 of Set 11 | brak
Processing Record 33 of Set 11 | vila franca do campo
Processing Record 34 of Set 11 | mil'kovo
Processing Record 35 of Set 11 | panama city beach
```

```
Processing Record 36 of Set 11 | tadine
Processing Record 37 of Set 11 | luza
Processing Record 38 of Set 11 | gwadar
Processing Record 39 of Set 11 | jining
Processing Record 40 of Set 11 | bandar seri begawan
Processing Record 41 of Set 11 | turpan
Processing Record 42 of Set 11 | rabo de peixe
Processing Record 43 of Set 11 | arkhangel'sk
Processing Record 44 of Set 11 | nereta
City not found. Skipping...
Processing Record 45 of Set 11 | meadow lakes
Processing Record 46 of Set 11 | al jumum
Processing Record 47 of Set 11 | usinsk
Processing Record 48 of Set 11 | lagoa
Processing Record 49 of Set 11 | cidreira
Processing Record 0 of Set 12 | bamboo flat
Processing Record 1 of Set 12 | savanna-la-mar
Processing Record 2 of Set 12 | filipstad
Processing Record 3 of Set 12 | acoua
Processing Record 4 of Set 12 | korhogo
Processing Record 5 of Set 12 | jaciara
Processing Record 6 of Set 12 | lerwick
Processing Record 7 of Set 12 | dawei
Processing Record 8 of Set 12 | tocopilla
Processing Record 9 of Set 12 | maraba
Processing Record 10 of Set 12 | aketi
Processing Record 11 of Set 12 | dunedin
Processing Record 12 of Set 12 | tangalle
Processing Record 13 of Set 12 | north bondi
Processing Record 14 of Set 12 | okha
Processing Record 15 of Set 12 | muynoq
Processing Record 16 of Set 12 | benghazi
Processing Record 17 of Set 12 | port clinton
Processing Record 18 of Set 12 | novodvinsk
Processing Record 19 of Set 12 | tamala
Processing Record 20 of Set 12 | vila do maio
Processing Record 21 of Set 12 | tranovaho
City not found. Skipping...
Processing Record 22 of Set 12 | hongqiao
Processing Record 23 of Set 12 | nicoya
Processing Record 24 of Set 12 | north platte
Processing Record 25 of Set 12 | ulanhot
Processing Record 26 of Set 12 | kununurra
Processing Record 27 of Set 12 | nephi
Processing Record 28 of Set 12 | khamis mushait
Processing Record 29 of Set 12 | menongue
Processing Record 30 of Set 12 | karpinsk
Processing Record 31 of Set 12 | daru
Processing Record 32 of Set 12 | bahia honda
Processing Record 33 of Set 12 | hilo
Processing Record 34 of Set 12 | mormugao
Processing Record 35 of Set 12 | kutum
Processing Record 36 of Set 12 | giyani
Processing Record 37 of Set 12 | mumbwa
Processing Record 38 of Set 12 | lae
Processing Record 39 of Set 12 | casas grandes
```

```
Processing Record 40 of Set 12 | talakan
Processing Record 41 of Set 12 | nykobing falster
Processing Record 42 of Set 12 | corowa
Processing Record 43 of Set 12 | toga village
City not found. Skipping...
Processing Record 44 of Set 12 | borkum
Processing Record 45 of Set 12 | pasuquin
Processing Record 46 of Set 12 | dazhou
Processing Record 47 of Set 12 | raduzhny
Processing Record 48 of Set 12 | odienne
Processing Record 49 of Set 12 | canavieiras
Processing Record 0 of Set 13 | at taj
Processing Record 1 of Set 13 | pemba
Processing Record 2 of Set 13 | bairnsdale
Processing Record 3 of Set 13 | hilton head island
Processing Record 4 of Set 13 | pemangkat
Processing Record 5 of Set 13 | sao jose do egito
Processing Record 6 of Set 13 | kapuskasing
Processing Record 7 of Set 13 | semera
Processing Record 8 of Set 13 | roses
Processing Record 9 of Set 13 | hastings
-----------------------------
Data Retrieval Complete
-----------------------------
```

In [4]:
```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[4]:
```
City          585
Lat           585
Lng           585
Max Temp      585
Humidity      585
Cloudiness    585
Wind Speed    585
Country       585
Date          585
dtype: int64
```

In [5]:
```python
# Display sample data
city_data_df.head()
```

Out[5]:

	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	D
0	bredasdorp	-34.5322	20.0403	16.22	77	100	3.24	ZA	1704606
1	adamstown	-25.0660	-130.1015	22.48	76	100	7.10	PN	1704606
2	iskateley	67.6803	53.1512	-16.10	95	16	3.13	RU	1704605
3	east london	-33.0153	27.9116	20.52	83	0	5.14	ZA	1704606
4	tiksi	71.6872	128.8694	-34.15	98	42	3.08	RU	1704606

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

In [7]:
```python
# 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	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country
City_ID								
0	bredasdorp	-34.5322	20.0403	16.22	77	100	3.24	ZA	17
1	adamstown	-25.0660	-130.1015	22.48	76	100	7.10	PN	17
2	iskateley	67.6803	53.1512	-16.10	95	16	3.13	RU	17
3	east london	-33.0153	27.9116	20.52	83	0	5.14	ZA	17
4	tiksi	71.6872	128.8694	-34.15	98	42	3.08	RU	17

Create the Scatter Plots Requested

Latitude Vs. Temperature

In [8]:
```python
# Build scatter plot for latitude vs. temperature
plt.scatter(city_data_df["Lat"], city_data_df["Max Temp"], edgecolors="black", alph

# Incorporate the other graph properties
plt.title("City Latitude vs. Max Temperature")
plt.xlabel("Latitude")
plt.ylabel("Max Temperature (ºC)")
plt.grid(True)

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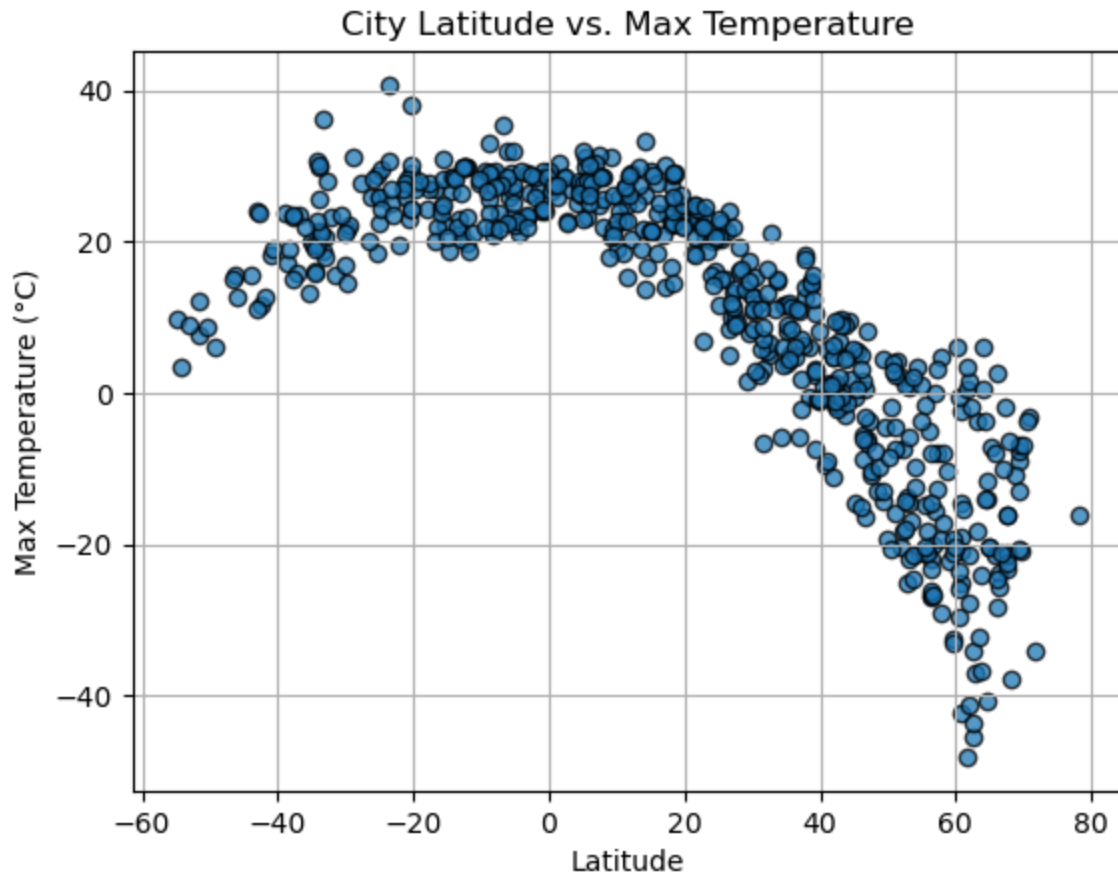
```
plt.savefig("../output_data/Fig1.png")

# Show plot
plt.show()
```

## City Latitude vs. Max Temperature

Latitude Vs. Humidity

```
In [9]:   # Build the scatter plots for latitude vs. humidity
          plt.scatter(city_data_df["Lat"], city_data_df["Humidity"], edgecolors="black", alph

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

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

          # Show plot
          plt.show()
```

City Latitude vs. Humidity
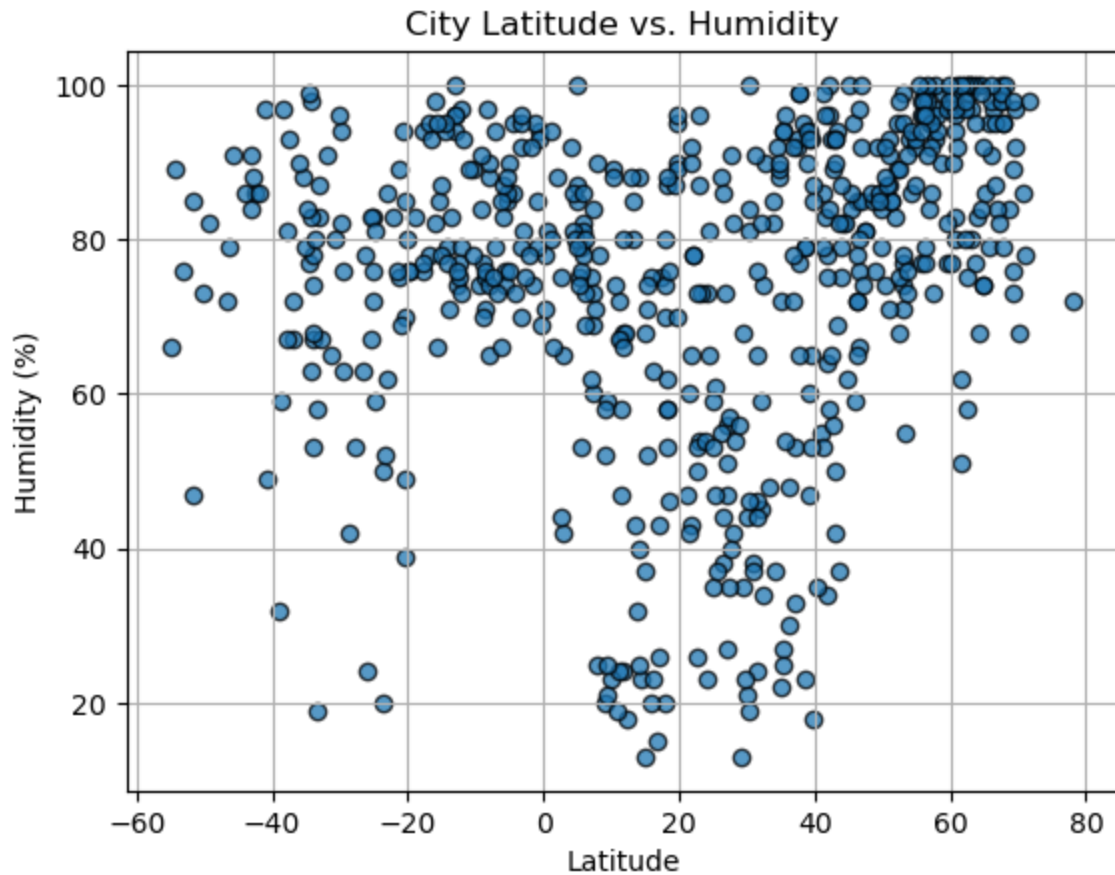
Latitude Vs. Cloudiness

```
In [10]:  # Build the scatter plots for latitude vs. cloudiness
          plt.scatter(city_data_df["Lat"], city_data_df["Cloudiness"], edgecolors="black", al

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

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

          # Show plot
          plt.show()
```

## City Latitude vs. Cloudiness
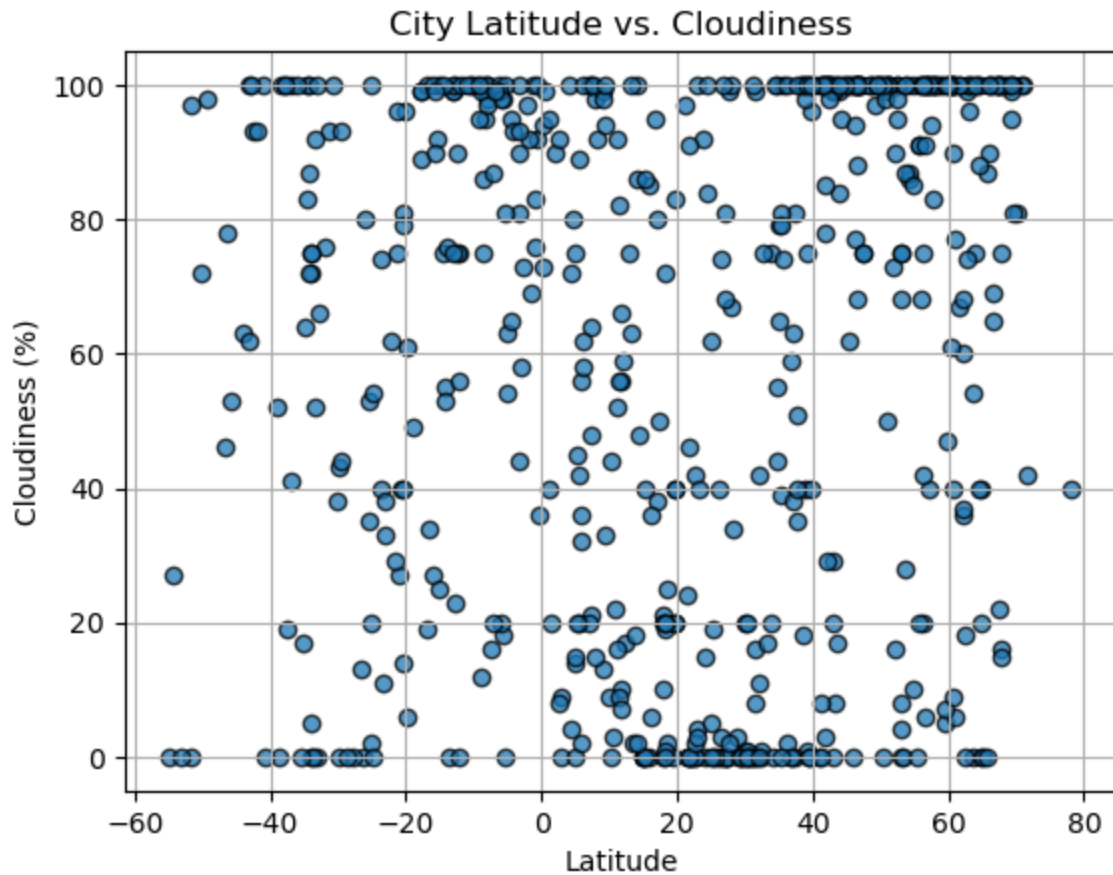
Latitude vs. Wind Speed Plot

```
In [11]:   # Build the scatter plots for latitude vs. wind speed
           plt.scatter(city_data_df["Lat"], city_data_df["Wind Speed"], edgecolors="black", al

           # Incorporate the other graph properties
           plt.title("City Latitude vs. Wind Speed")
           plt.xlabel("Latitude")
           plt.ylabel("Wind Speed (m/s)")
           plt.grid(True)


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

           # Show plot
           plt.show()
```
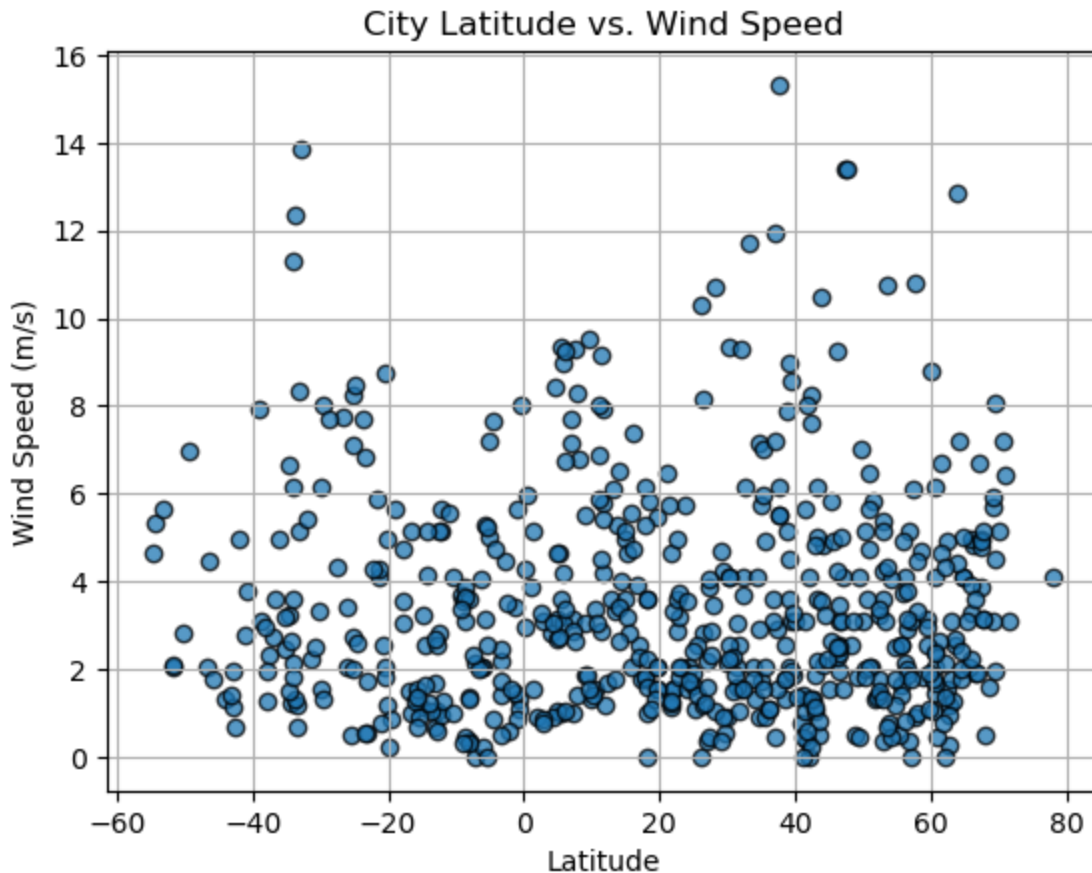
Requirement 2: Compute Linear Regression for Each Relationship

```
In [28]:  # Define a function to create Linear Regression plots
          def plot_linear_regression(x_values, y_values, title, xlabel, ylabel, hemisphere, f
              (slope, intercept, rvalue, pvalue, stderr) = linregress(x_values, y_values)
              regress_values = x_values * slope + intercept
              line_eq = f'y = {round(slope, 2)}x + {round(intercept, 2)}'

              # Plot & annotation
              plt.scatter(x_values, y_values, alpha=0.75)
              plt.plot(x_values, regress_values, "r-")
              plt.annotate(line_eq, (min(x_values), min(y_values)), fontsize=15, color="red")
              plt.annotate(f'R = {round(rvalue, 2)}', (min(x_values), min(y_values) + (max(y_
              plt.title(title)
              plt.xlabel(xlabel)
              plt.ylabel(ylabel)
              plt.grid(True)

              # Save the figure
              plt.savefig(f"../output_data/{hemisphere}_{file_name}.png")
```

```
In [29]:  # Create a DataFrame with the Northern Hemisphere data (Latitude >= 0)
          northern_hemi_df = city_data_df[city_data_df["Lat"] >= 0]
```

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

Out[29]:

City_ID	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	
2	iskateley	67.6803	53.1512	-16.10	95	16	3.13	RU	170
4	tiksi	71.6872	128.8694	-34.15	98	42	3.08	RU	170
7	jamestown	42.0970	-79.2353	-1.66	100	100	0.00	US	170
10	thompson	55.7435	-97.8558	-20.91	77	100	2.57	CA	170
13	summerside	46.3959	-63.7876	-8.81	85	77	3.09	CA	170

In [30]:
```
# Create a DataFrame with the Southern Hemisphere data (Latitude < 0)
southern_hemi_df = city_data_df[city_data_df["Lat"] < 0]

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

Out[30]:

City_ID	City	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Country	
0	bredasdorp	-34.5322	20.0403	16.22	77	100	3.24	ZA	17
1	adamstown	-25.0660	-130.1015	22.48	76	100	7.10	PN	17
3	east london	-33.0153	27.9116	20.52	83	0	5.14	ZA	17
5	campos belos	-13.0367	-46.7717	21.06	96	99	0.70	BR	17
6	port elizabeth	-33.9180	25.5701	21.29	78	0	3.60	ZA	17

Temperature vs. Latitude Linear Regression Plot

In [31]:
```
# Linear regression on Northern Hemisphere
plot_linear_regression(northern_hemi_df["Lat"], northern_hemi_df["Max Temp"],
                       "Northern Hemisphere - City Latitude vs. Max Temperature",
                       "Latitude", "Max Temperature (°C)", "northern", "Fig1_Northe
```
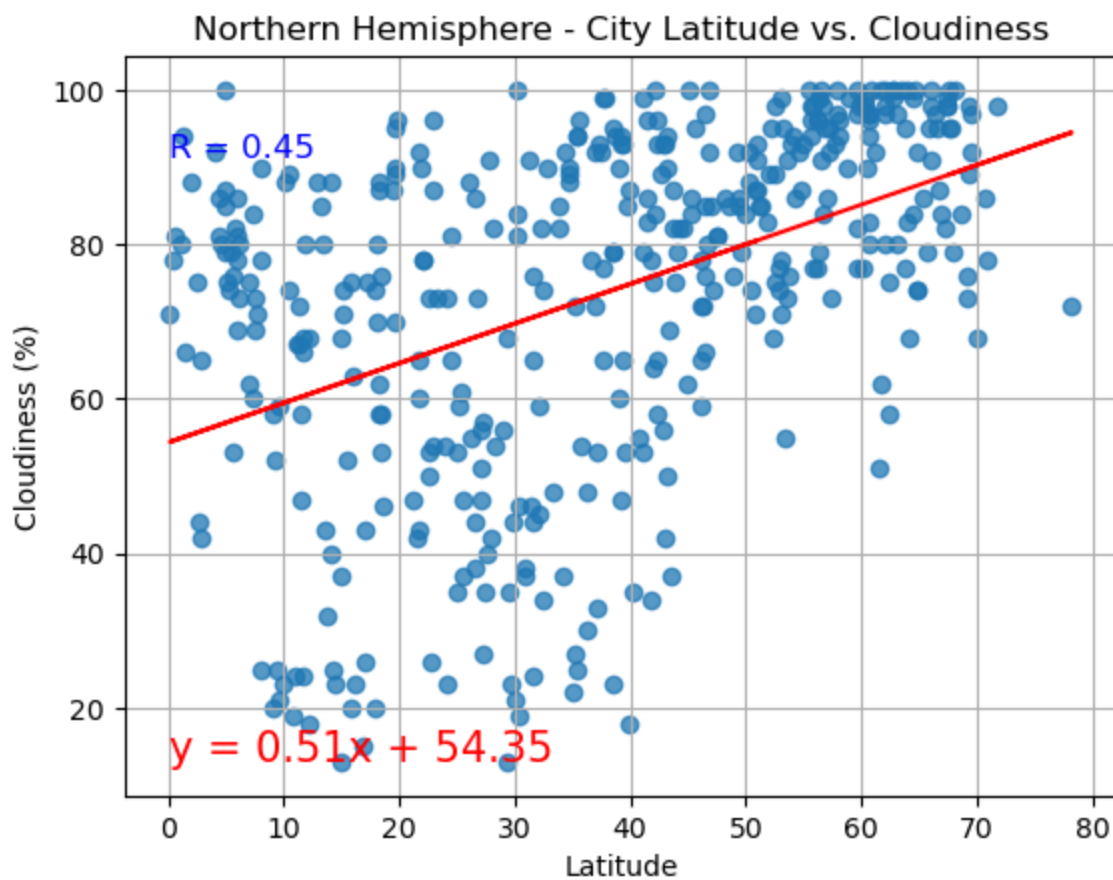
Northern Hemisphere - City Latitude vs. Max Temperature

R = -0.88

$y = -0.81x + 34.73$
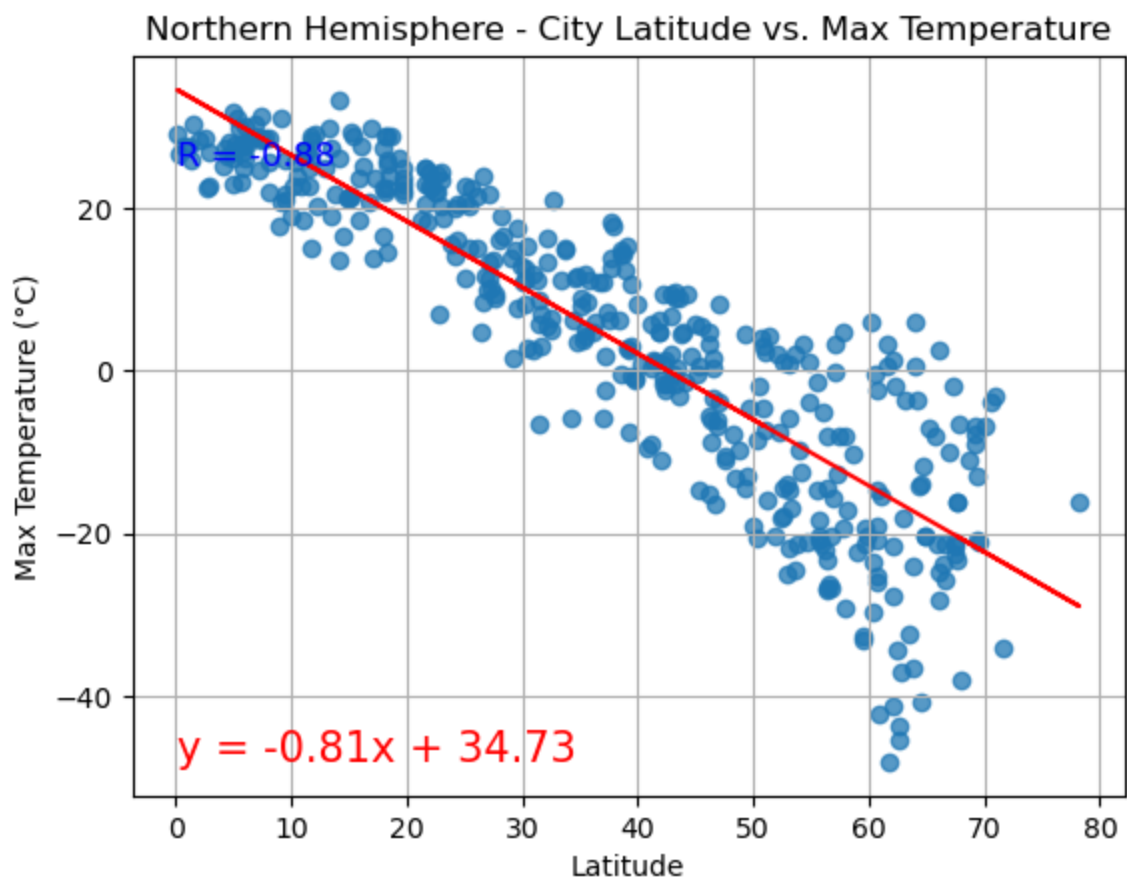
In [32]: # Linear regression on Southern Hemisphere
         plot_linear_regression(southern_hemi_df["Lat"], southern_hemi_df["Max Temp"],
                                "Southern Hemisphere - City Latitude vs. Max Temperature",
   "Latitude", "Max Temperature (°C)", "southern", "Fig1_Southe

Southern Hemisphere - City Latitude vs. Max Temperature
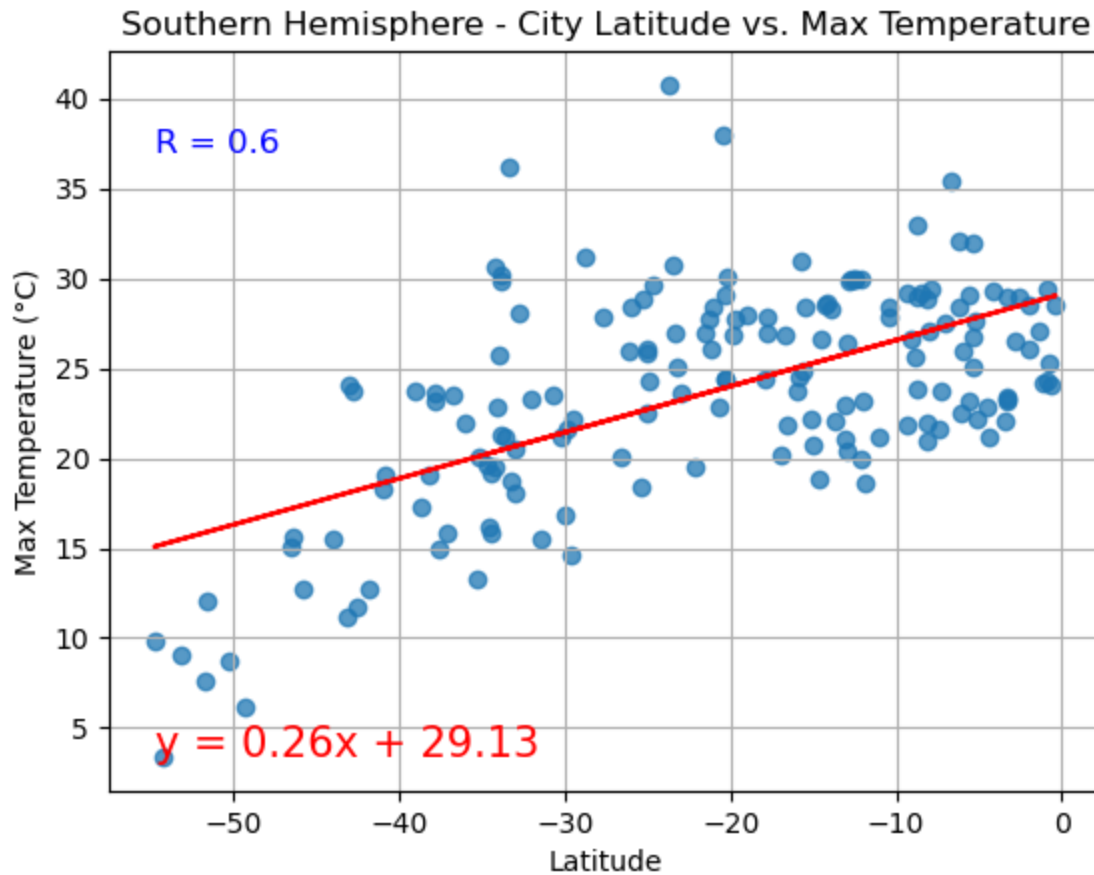
Discussion about the linear relationship: Northern Hemisphere - Higher the Latitude the Lower the Temperature Southern Hemisphere - Higher the Latitue the Higher the Temperature

Humidity vs. Latitude Linear Regression Plot

```
In [33]:  # Northern Hemisphere
          plot_linear_regression(northern_hemi_df["Lat"], northern_hemi_df["Humidity"],
                                 "Northern Hemisphere - City Latitude vs. Cloudiness",
                                 "Latitude", "Cloudiness (%)", "northern", "Fig3_Northern")
```

Northern Hemisphere - City Latitude vs. Cloudiness

R = 0.45

y = 0.51x + 54.35
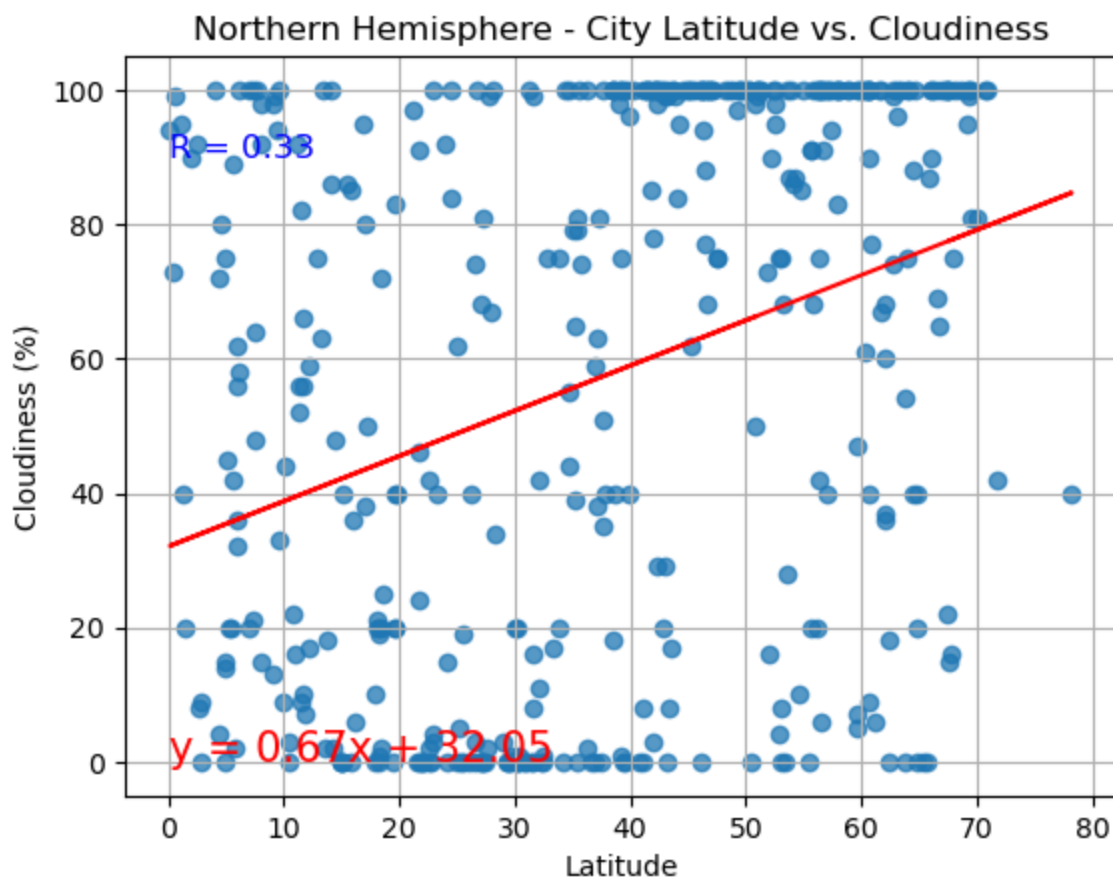
```
In [34]:  # Southern Hemisphere
          plot_linear_regression(southern_hemi_df["Lat"], southern_hemi_df["Humidity"],
                                 "Southern Hemisphere - City Latitude vs. Cloudiness",
                                 "Latitude", "Cloudiness (%)", "southern", "Fig3_Southern")
```
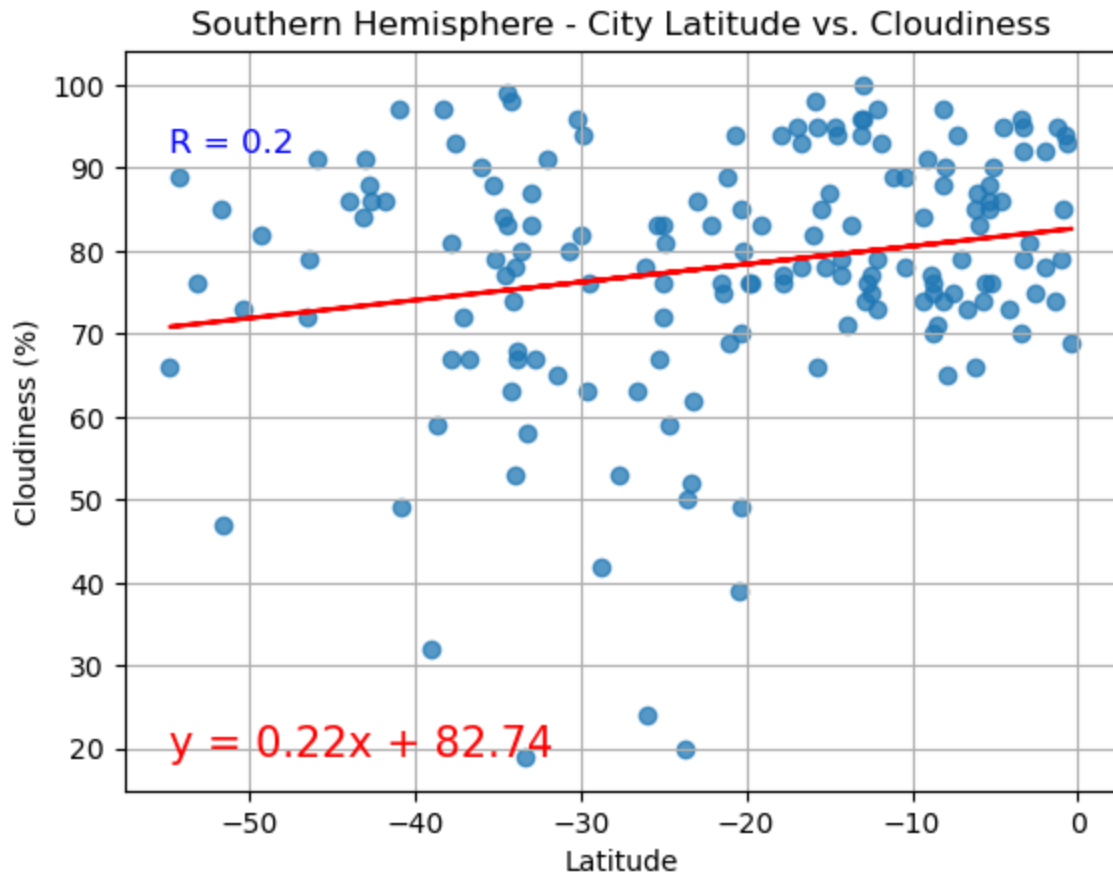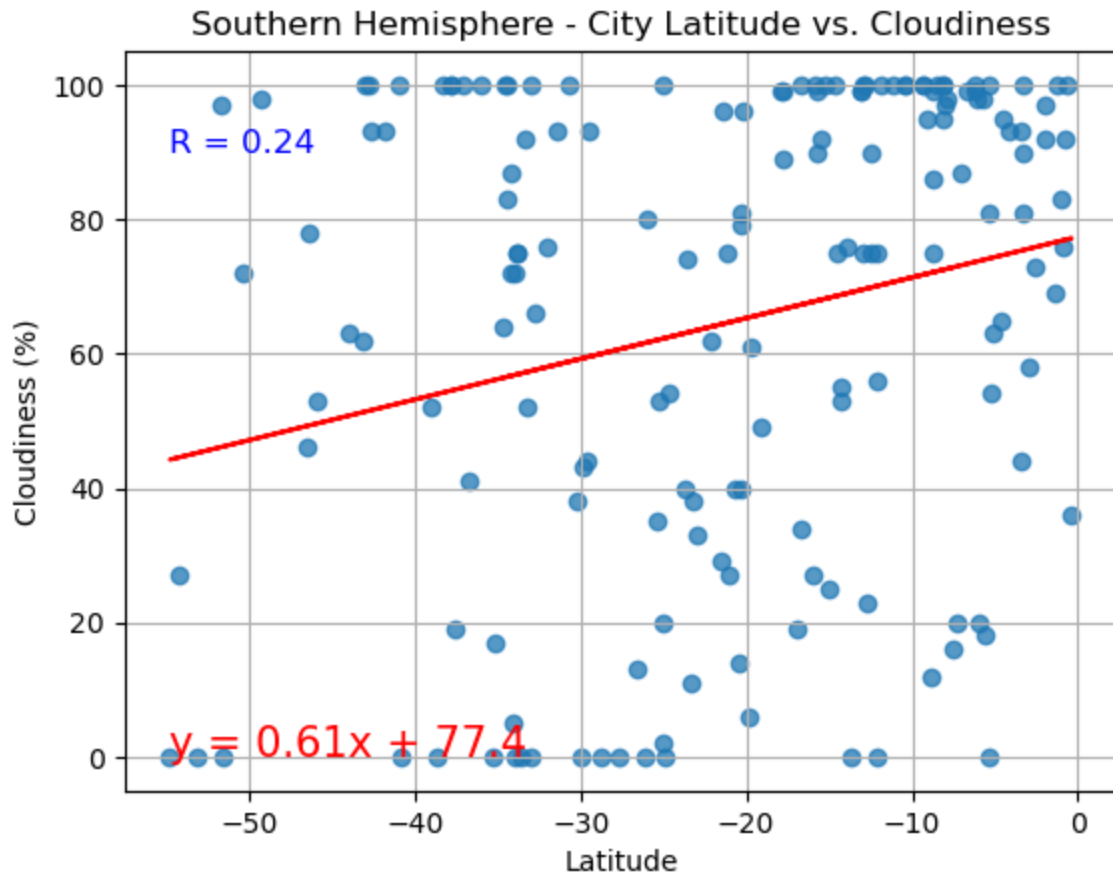
Discussion about the linear relationship: No Correlation - Humidity is more correlated to sea level & local geographical criteria

Cloudiness vs. Latitude Linear Regression Plot

```
In [35]:  # Northern Hemisphere
          plot_linear_regression(northern_hemi_df["Lat"], northern_hemi_df["Cloudiness"],
                                 "Northern Hemisphere - City Latitude vs. Cloudiness",
                                 "Latitude", "Cloudiness (%)", "northern", "Fig3_Northern")
```

Northern Hemisphere - City Latitude vs. Cloudiness

R = 0.33

y = 0.67x + 32.05
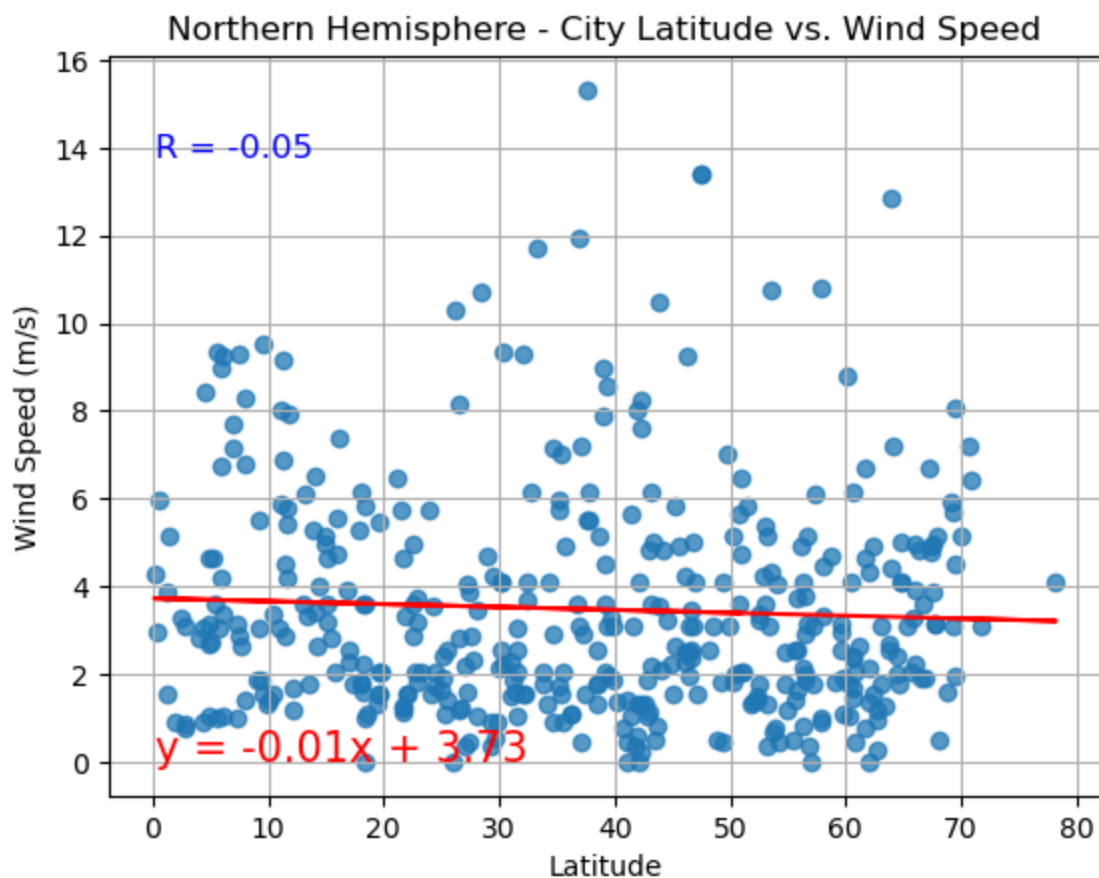
```
In [36]:  # Southern Hemisphere
          plot_linear_regression(southern_hemi_df["Lat"], southern_hemi_df["Cloudiness"],
                                 "Southern Hemisphere - City Latitude vs. Cloudiness",
                                 "Latitude", "Cloudiness (%)", "southern", "Fig3_Southern")
```

Southern Hemisphere - City Latitude vs. Cloudiness

R = 0.24

y = 0.61x + 77.4

Discussion about the linear relationship: No Correlation - Cloudiness is based on wind direction and sea level as well

Wind Speed vs. Latitude Linear Regression Plot

```
In [37]:   # Northern Hemisphere
           plot_linear_regression(northern_hemi_df["Lat"], northern_hemi_df["Wind Speed"],
                                  "Northern Hemisphere - City Latitude vs. Wind Speed",
                                  "Latitude", "Wind Speed (m/s)", "northern", "Fig4_Northern")
```

Northern Hemisphere - City Latitude vs. Wind Speed

R = -0.05

y = -0.01x + 3.73

Wind Speed (m/s)

Latitude

In [38]:
```python
# Southern Hemisphere
plot_linear_regression(southern_hemi_df["Lat"], southern_hemi_df["Wind Speed"],
                       "Southern Hemisphere - City Latitude vs. Wind Speed",
                       "Latitude", "Wind Speed (m/s)", "southern", "Fig4_Southern")
```
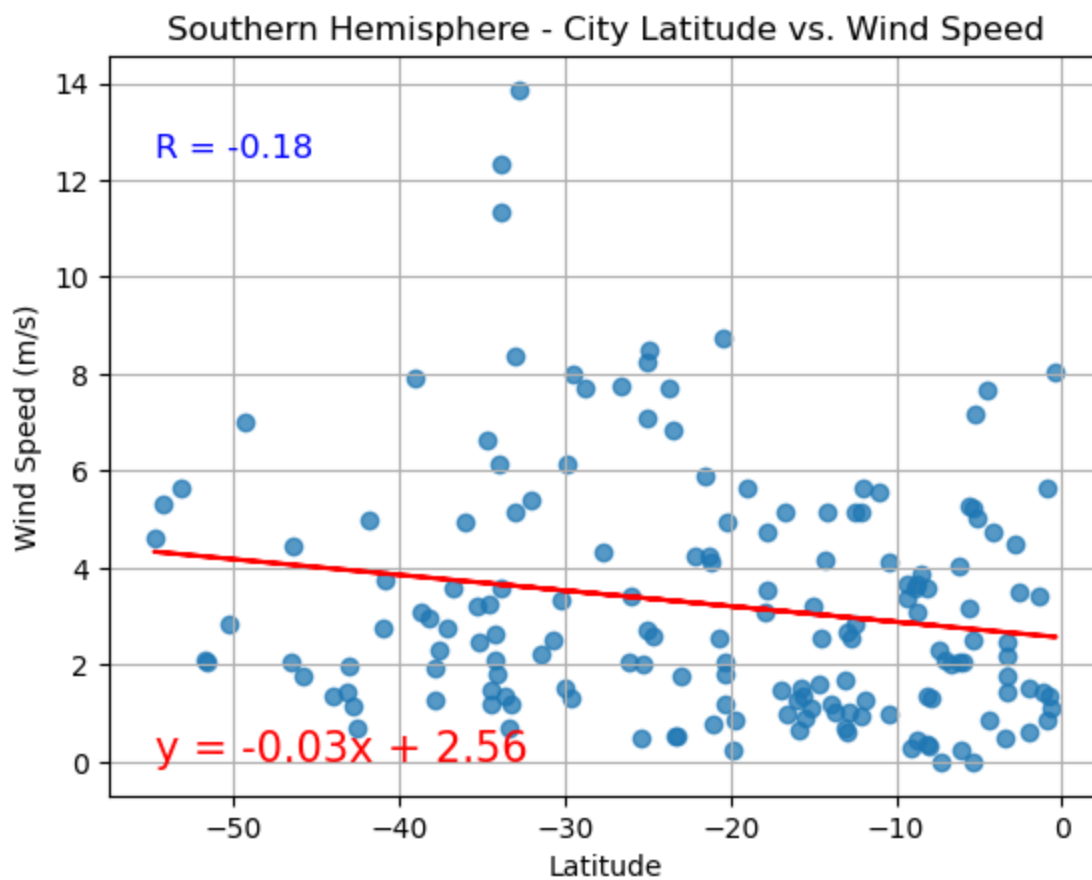
Discussion about the linear relationship: No Correlation - Should be based more on geographical and infrasture in the cities that might possibily impact this graph.