Step 1 - Climate Analysis and Exploration

Precipitation Analysis

In [1]:

```
import pandas as pd
from matplotlib import style
style.use('fivethirtyeight')
import matplotlib.pyplot as plt
import numpy as np
import datetime as dt
```

In [2]:

```
import sqlalchemy
from sqlalchemy.ext.automap import automap_base
from sqlalchemy.orm import Session
from sqlalchemy import create_engine, func  # create engine to hawaii.sqlite
engine = create_engine("sqlite:///hawaii.sqlite")
```

In [3]:

```
session = Session(bind=engine)
```

In [4]:

```
Base = automap_base()
Base.prepare(engine, reflect=True)
Base.classes.keys()
```

Out[4]:

```
['measurement', 'station']
```

In [5]:

```
Measurement = Base.classes.measurement
Station = Base.classes.station
```

In [6]:

```
conn = engine.connect()
measurement_data = pd.read_sql("SELECT * FROM measurement", conn)
station_data = pd.read_sql("SELECT * FROM station", conn)
```

In [7]:

```
# most recent date
measurement_data['date'].max()
```

Out[7]:

```
'2017-08-23'
```

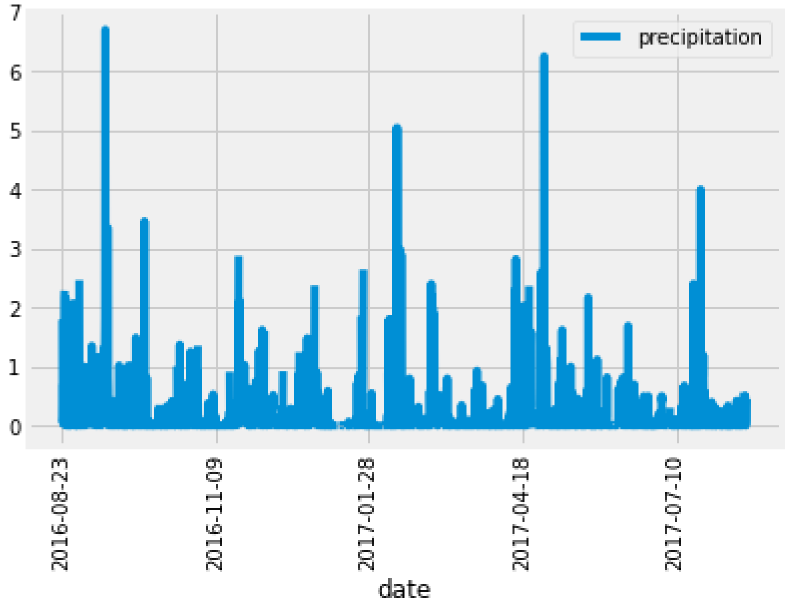
In [8]:

```
prev_year = dt.date(2017, 8, 23) - dt.timedelta(days=365)
```

In [9]:

```
# Perform a query to retrieve the data and precipitation scores
results = session.query(Measurement.date, Measurement.prcp).filter(Measurement.d
# Save the query results as a Pandas DataFrame and set the index to the date col
df = pd.DataFrame(results, columns=['date', 'precipitation'])
# Sort the dataframe by date
df.sort_values('date').plot(x = 'date', y = 'precipitation', rot = 90)
```

Out[9]:
```
<AxesSubplot:xlabel='date'>
```



In [10]:
```
df.describe()
```

Out[10]:

	precipitation
count	2021.000000
mean	0.177279
std	0.461190
min	0.000000
25%	0.000000
50%	0.020000
75%	0.130000
max	6.700000

Station Analysis

In [11]:
```
# total number of stations
print(f' The total number of stations is {session.query(Station.id).count()}')
```

```
 The total number of stations is 9
```

In [12]:
```
# Design a query to find the most active stations (i.e. which stations have the
# List the stations and observation counts in descending order.
station_count = session.query(Measurement.station, func.count(Measurement.statio
station_count
```

Out[12]:
```
[('USC00519281', 2772),
 ('USC00519397', 2724),
 ('USC00513117', 2709),
 ('USC00519523', 2669),
 ('USC00516128', 2612),
 ('USC00514830', 2202),
 ('USC00511918', 1979),
 ('USC00517948', 1372),
 ('USC00518838', 511)]
```

In [13]:

```
# Which station id has the highest number of observations?
most_active_station = station_count[0][0]
print(f' The station with the highest number of observations is {most_active_sta
```

```
 The station with the highest number of observations is USC00519281 with 2772 ob
servations
```

In [14]:

```
# Using the most active station id, calculate the lowest, highest, and average t
print(f' The lowest, highest, and average temperature of station {most_active_st
```

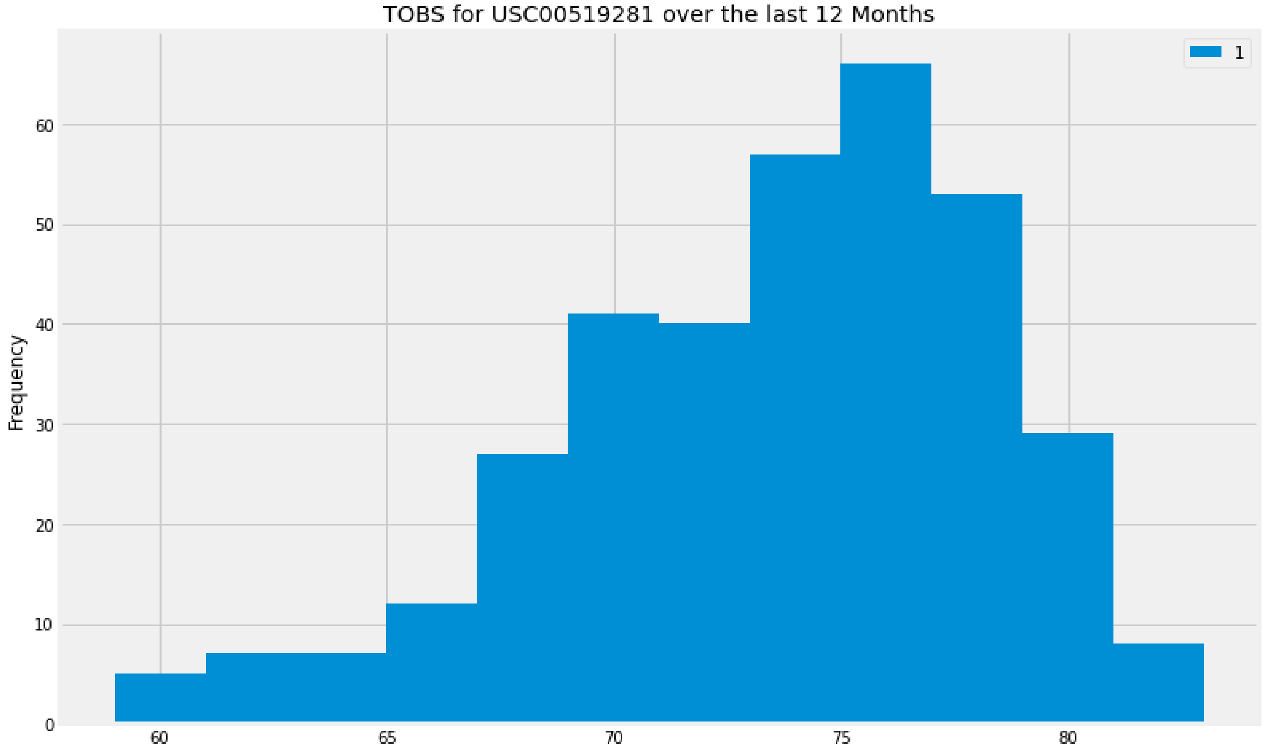
```
 The lowest, highest, and average temperature of station USC00519281 is [(54.0,
85.0, 71.66378066378067)] respectively
```

In [33]:

```
# Design a query to retrieve the last 12 months of temperature observation data
# Filter by the station with the highest number of observations.
results = session.query(Measurement.station, Measurement.tobs).filter(Measuremen
# Plot the results as a histogram with bins=12.
df = pd.DataFrame(results)
df.plot.hist(by='0', bins=12, figsize=(12,8), title = f'TOBS for {most_active_st
```

Out[33]:

```
<AxesSubplot:title={'center':'TOBS for USC00519281 over the last 12 Months'}, yl
abel='Frequency'>
```



In [ ]: