**Seattle Weather Project Report**

The project is to perform data science methodology to examine prescription data and determine whether it rains more in Seattle, WA or New York City, NY. Both cities are known for their rain, but they differ in timing and frequency. Seattle’s tends to have a lot of rainy days throughout the year, while New York City is more known for the total annual rainfall inches. The goal of this analysis is to describe how often it rains in each city throughout the year, based on the proportion of days with measurable precipitation.

**Data**:

Daily precipitation data were collected for both cities from NOAA Climate data Online

* Seattle: US1WAKG0225 (SEATTLE 2.1 ESE, WA US)
* New York City: USW00094789 (JFK International Airport, NY US)
* Both datasets contain daily observations from 2018 – 2022, including columns such as DATE, PRCP, SNOW, and SNWD.
* I didn’t use the missing or irrelevant columns such as DAPR, SNWD, WESD, WESF, SNOW.
* I combined both cities’ datasets, the Seattle and NYC data frames were merged on DATE, keeping only the DATE and PRCP columns. New columns labeled each observation as “SEA” or “NYC”

**Methods**:

Data cleaning and analysis were conducted in Python using pandas, NumPy, and Seaborn

1. Filtering: Days with missing precipitation values were identified using .isna() and replaced with daily mean precipitation for that specific day-of-year, calculated from all available years.
2. Validation: After imputation, no missing values remained df.isna().sum()
3. Aggregation: Monthly and yearly rainfall summaries were computed using groupby().
4. Visualization: Boxplots and bar charts were created to show the distribution and frequency of rainfall across months and cities.

The mean daily precipitation was also compared between cities. NYC averaged 0.1257 inches per day, while Seattle averaged 0.1133 inches, indicating that although Seattle rains more often, NYC experiences slightly heavier rainfall when it occurs.

**Conclusion**:

* Seattle: Frequent and light rainfall concentrated in winter.
* New York City: Less frequent but heavier rainfall. Evenly distributed across the year.

By merging datasets, filling missing values, and averaging across years, the analysis provides a robust comparison. The data confirm that while Seattle rains more often, New York experiences stronger rainfall intensity.

**Results**:

#1 Monthly proportion of days with precipitation

A graph of different colored bars

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Seattle shows rain on over 70% of days in winter time (November – February), while NYC averges 30-40% during the same months. Both cities dry out in summer, especially during July and August/ The seasonal contrast is more pronounced in Seattle, consistent with its climate.

#2 Average annual rainfall frequency

A graph of different blue squares

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Seattle experiences precipitation on 55% of days annually, compared to 35% for New York City. Although NYC’s average rainfall depth per event is higher, Seattle’s overall frequency confirms its reputation as the rainier city daily experience.

#3 Monthly Precipitation amounts

A diagram of a graph

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Both cities show high variability in individual daily precipitation, with more extreme rainfall events in NYC. Seattle’s boxes are narrower, showing steadier, lighter rainfall throughout the wet season, while NYC’s wider distributions reflect periodic heavy storms.