**Summary of Exploratory Data Analysis**

Cory Golladay

DSC 530 Data Exploration and Analysis (Metzger)

This exploratory data analysis (EDA) focused on the statistical question: *Do U.S. Presidents influence gas prices, and are gas prices systematically lower under one administration compared to another administration?* Using data from 1950 to 2023, the analysis examined key variables such as gas prices, crude oil prices, GDP, CPI, and political party affiliation. The objective was to identify correlations, trends, and potential causative relationships between gas prices and these variables.

The EDA revealed several significant outcomes. Gas prices exhibited a strong positive correlation with crude oil prices (Pearson’s r ≈ 0.98) across both Democratic and Republican terms, affirming the dominant role of market conditions in driving fuel costs. GDP and CPI also showed positive correlations with gas prices, reflecting broader economic influences such as inflation and economic activity. However, hypothesis testing using a permutation test indicated that differences in gas prices between Democratic and Republican administrations were not statistically significant (p-value = 0.277). Regression analysis further supported these findings, showing that economic factors like crude oil prices and CPI explain most of the variability in gas prices, with minimal contribution from party affiliation.

Several aspects were missed during the analysis. The dataset did not include granular policy-level data or external factors, such as OPEC decisions, which could significantly impact crude oil prices and, consequently, gas prices. Including these variables could have enriched the analysis and provided deeper insights into gas price fluctuations. However, collecting these datasets was too time-consuming and beyond the scope of this project. Additionally, the dataset lacked data prior to 1950, limiting the historical scope of the study.

The analysis assumed that the relationships between variables remained consistent over time and across administrations, which may not fully account for shifts in economic policy or global market dynamics. This assumption could oversimplify the complex interplay of factors influencing gas prices.

Challenges included handling skewed data distributions and interpreting historical economic anomalies, such as oil crises and recessions, without additional contextual data. While the statistical methods were clear, understanding the broader implications of these events requires domain knowledge and additional research.

Overall, the analysis demonstrated that gas prices are primarily influenced by economic fundamentals, with political party affiliation playing a negligible role. Future work could incorporate policy-specific data and global market indicators to address these gaps and further refine the conclusions.