1-2 Our project consists of a fuel cost analysis of different types of automobiles. While our team was researching information about these automobiles, we started to discuss the different types of gasoline, specifically the midgrade. Most of us were familiar with the regular octane and premium octane and had limited knowledge on what it was and how it was used. We just did not grasp the concept of what the midgrade gasoline was and why it was still available. This led us in our research to a fuel economy dataset from the EPA. We wanted to study its contents to learn more about the different types of gasoline available in the market, how its costs are determined, and if they play a role with vehicle manufacturers on how they set the miles per gallon when building their vehicles.

3 We had plenty of hypotheses that we wanted to research. They included analyzing how the average fuel cost has decreased in recent years due to increased efficiency in vehicle, particularly the miles per gallon. We also looked at standard class vehicles and how they are more fuel efficient than performance class vehicles. There were also manual transmission vehicles that were more fuel efficient than automatic transmission vehicles. We wanted to study the front-wheel, rear-wheel, and all-wheel drive vehicles to see if they all had a similar fuel efficiency. Finally, we wanted to show that midgrade gasoline did not play a significant factor in average fuel cost and does not have a noticeable effect on overall fuel costs and miles per gallon.

4 The first study we looked at was the average annual fuel cost for all vehicles made from 1984 to 2017. These prices were recorded every year and rounded to the nearest $50. Fuel costs averaged a little over $1900 starting in 1984 and would rise and fall every year peaking at just below $2100 starting in 2003 and stayed there until 2008 when the costs started to trend downward sharply. That trend really peaked our interest and we wanted to pursue further data to see if we can figure out exactly what caused the prices to drop so suddenly and consistently.

5 We moved on to the average annual miles per gallon for all vehicles from 1984 to 2017. This data showed that miles per gallon were rising and falling very closely from 19 and 20 miles per gallon between 1984 and 2009. Starting in 2010, the average miles per gallon increased every year, eventually peaking at a little over 25 miles per gallon in 2016. This trend showed that by 2010 the automobile manufacturers were able to increase the miles per gallon steadily each year moving forward. This could also mean that this may have been a response to rising fuel costs or may include technological advances that helped boost the miles per gallon in these vehicles.

6 Moving to the next set of data, we wanted to analyze more specific information. We used different vehicle classes to see if there were any comparisons in trends. Toyotas were classified as our standard vehicles due to their quite common nature on the market. Porsches were also used as our performance vehicle with the higher standards. We looked at the average fuel cost first to see if there were any noticeable trends. The Porsche’s costs were consistently higher than the Toyota’s. The similar trend of costs moving up and down between 1984 and 2005 were continuously rising and falling steadily. What was noticeable was that the costs for both vehicles trended downwards after 2010. This was consistent with the analysis of the average annual fuel cost of all the vehicle classes shown earlier.

7 We even looked at the miles per gallon for both the Toyota and the Porsche. The Toyota was consistently higher than the Porsche every year. There is even a similar trend of miles per gallon increasing rapidly after 2010. This confirms that there had to be a change in the market, whether it be technological advances or a response to rising fuel costs.

8 We also wanted to look at different features of an automobile to see if there were any trends in fuel costs. An analysis of automatic and manual transmission vehicles was done. In this plot, the y-axis did not contain a value as it was the ID number for the vehicles that were mentioned in the dataset. Therefore, the numbers associated with the y-axis do not provide a specific value to the dataset. As shown here, there were a few outliers in the higher annual cost vehicles, but most of the data hovered around $2500. Overall, the automatic transmission vehicle’s average fuel cost was $1753.01 in 2017.

9 As you can see, the manual transmission vehicles manufactured in 2017 are much lower in number but also had lower costs than the automatic transmission vehicles shown earlier. This could be attributed to a decline in sales for manual transmission vehicles. Outliers existed here as well and similarly to the automatic transmission vehicles, most of the vehicles had a cost of below $2500. The average fuel cost for manual transmission vehicles was $1634.97.

10 As you can see by looking at both vehicle types together, we can see that the manual transmission vehicles had a slight edge in lower fuel costs than the automatic transmission vehicles had for the 2017 vehicles.

11 The next item we researched was the drive type for each automobile. The annual fuel cost for front-wheel, rear-wheel, and all-wheel drive vehicles were analyzed for 2017. As you can see on the plot, the high limit to the fuel costs was mainly below $3000. Based on the data found, front-wheel drive vehicles had a slight advantage over the other 2 options with lower annual fuel costs which is shown below. Also, the potential outliers for the different drive types did not include front-wheel which led us to believe that front-wheel vehicle was more cost effective.

12 The last analysis we looked at was the different types of gasoline and their annual costs in 2017. This plot shows that regular and premium gasoline types are the preferred choices in fuel. There are instances of midgrade, but there was not a trend in how the midgrade annual costs are associated. We were also expecting to see a big different in the regular and premium gasoline prices, but most of them did tend to overlap. The annual cost of all of these fuel were consistent with their pricing levels as regular was lower than midgrade and premium, but it was interesting to see that the prices for midgrade were slightly higher than the premium prices.

13 This is our final answers to all of the hypotheses listed in the beginning. (go over each line)

14 Any questions?