Questions:

1) Calculate the percent of individuals that travel less than 5 - 100 miles a day for every 5 mile increments (e.g. 5, 10, 15, ..., 95, 100).

2) Calculate the average fuel economy of all miles traveled for trips less than specific distances from previous problem. Only consider trips that utilize a household vehicle (VEHID is 1 or larger), use the EPA combined fuel economy (EPATMPG) for the particular vehicle.

3) Calculate the percent of transportation CO2 emissions should be attributed to household vehicles for each month of the survey (3/2008 – 04/2009). For this problem assume that the data is an accurate representation of the estimated 117,538,000 households in the US. Assume that 8.887 × 10-3 metric tons CO2 is produced from each gallon of gasoline combusted.

4) Plug-in hybrid vehicles have recently become commercially available; these vehicles operate in a purely electric mode, or in a hybrid mode. Assume that every vehicle is a plug-in hybrid that has X miles of all electric range. The first X miles in a given day will be driven all electric and the remainder will be at the fuel economy listed for the particular vehicle. The Energy Efficiency Ratio (EER) is used to estimate the amount of electricity an equivalent electric vehicle will consume. Assuming an EER of 3.0 and 33.1kWh per gallon of gasoline, you can calculate the equivalent energy efficiency in miles/kWh by multiplying the EPA combined fuel economy by 0.090634441. Calculate the change of CO2 over the months of the survey if every household vehicle were plug- in hybrids with 20 mile electric range. Calculate for 40 and 60 mile electric ranges as well.

5a) The Nissan Leaf has a range of 84 to 107 miles and the Tesla Model S has a range of 208 to 270 miles. Repeat problem 3d except that all trips less than 84 miles are handled electric and all trips greater than 84 miles are handled conventionally (not just the first 84 miles). Assume that if the trip is handled in a conventional vehicle if the trip is greater than 84 miles. Calculate also for 107, 208, and 270 miles.

5b) Repeat 5a on a monthly basis for year 2014; assume transportation in a particular month is equivalent to those months in the survey. Also assume that all additional electricity will be met with a combination of Nuclear, Wind, and Natural Gas. These will be proportional to the amount of their relative energy production in a particular month. Calculate the change of CO2 in each of the months.