

## CISC 6745 Data Visualization

Homework 1 (100 points)

**Deadline:** Sep 30th, 11:59PM

### Objective

Use Tableau to analyze and reveal various relationships within a data set.

### Data

Fuel economy data for 2015 model year cars

### Tasks

1. Create a Word/PDF document that answers the following questions
2. Create 3 data visualizations, one for each big question listed on the next page. Each visualization should be pasted as a figure following the answer sheet and it should provide the answer to the complete question. Label each figure as "Question 1," "Question 2," and so on.
3. Using the visualizations you created in 2 above, answer **each question** using the Deliverable Worksheet at the end of this document.
4. You should use the chart type specified by the question.

### Tips

- You should construct your visualizations so that they appropriately display the data.
- Keep in mind principles that we've discussed in class, such as good use of colors and scale. Don't be afraid to play around with fonts and colors. Also remember, simplicity is good.
- Make sure you are aware of when to use sums versus averages.

Note: You should submit a **PDF** to BlackBoard containing the Deliverable Worksheet and accompanying visualizations by the due date.

## Grading

For each question, your work will be evaluated using the following criteria:

Criteria	Weight	Description
Answer	50%	Is the answer to the question correct?
Visualization Method	20%	Is the right visualization chosen as specified in the instructions?
Visualization Design	30%	Are the axes and data points labeled properly and readable?

## Questions

### Question 1 (25 points)

- a) Which car manufacturer has the highest average CO2 Emission on Highway?
- b) Which car manufacturer has the highest average CO2 Emission in City?

### Question 2 (30 points)

- a) Which car manufacturer has the greatest difference between its highway and city CO2 emission?
- b) Which car manufacturer has the smallest difference between its highway and city CO2 emission?

### Question 3 (30 points)

- a) What is the relationship between the number of cylinders and combined fuel efficiency?
- b) Which car models get better city mileage than highway mileage?
- c) What can you say about the combined CO2 emission of those cars in (b), compared to the rest of the group?

**Hint:** Answers to Question b and c should be reflected through some visual encoding in the Visual, for example, as color, node size, or label.

Timely submission 10%

Additional insights 5%

## Deliverable Worksheet

Student Name Debarshi Dutta

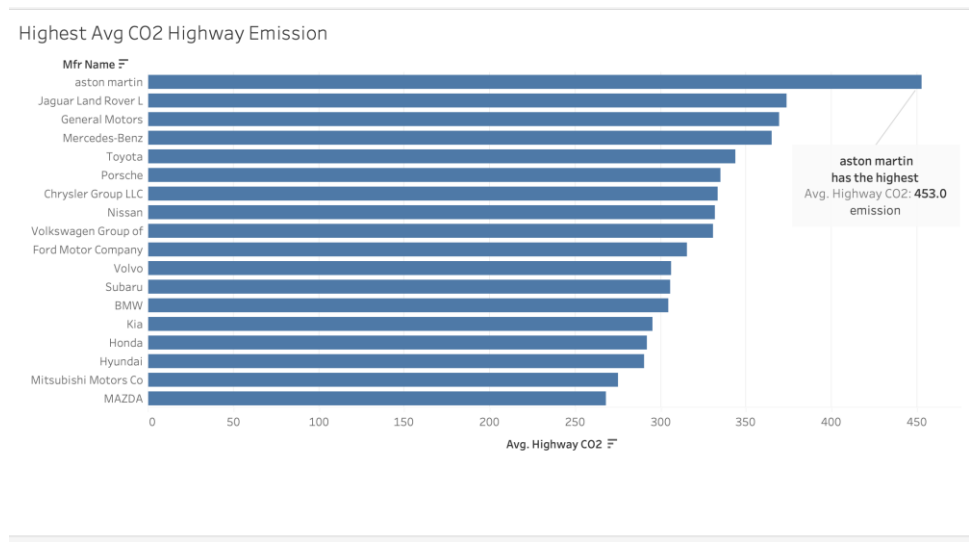
Use this worksheet format to complete the assignment.

The questions are on page 2.

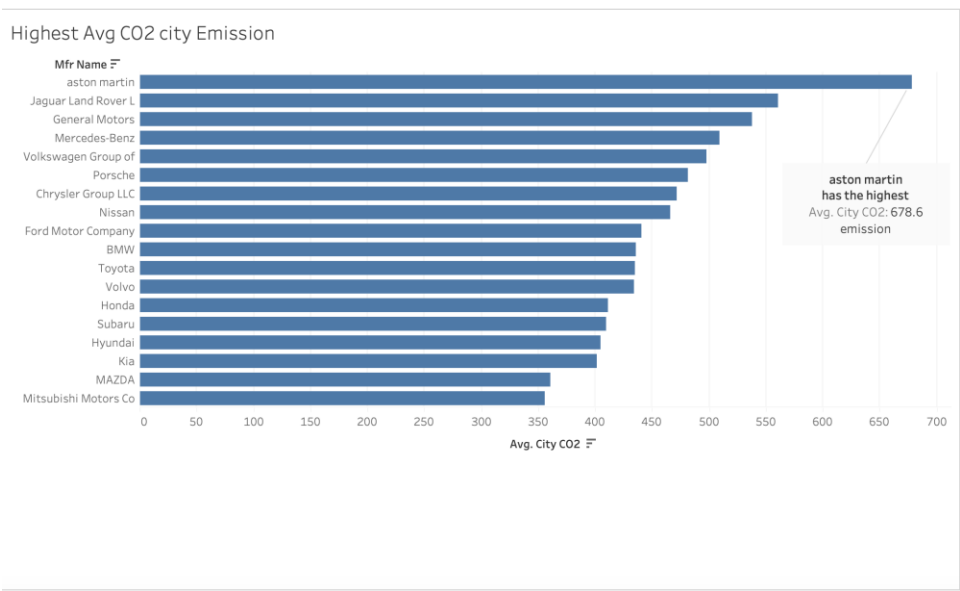
Question	Your Answer/ Findings
1a	Aston Martin
1b	Aston Martin
2a	General Motors
2b	Mitsubishi Motors Co.
3a	# Cylinders = $0.131949 \times \text{Combined FE} + 4.40677$
3b	<ul style="list-style-type: none"><li>• Toyota RX 450h</li><li>• Ford Fusion Hybrid FWD</li><li>• Toyota RX 450 AWD</li><li>• Ford MKZ Hybrid FWD</li></ul>
3c	These four cars (shown in blue) have considerably less CO <sub>2</sub> emission compared to the other cars (shown in red). The cars in blue are all hybrids so, logically they should have significantly less CO <sub>2</sub> emission than the other cars. The data visualization proves it.
Additional Insights	3a. The $p$ value is less than 0.05. So this is statistically significant. 3b. The cars that have better city mileage are all hybrids 3c. The cars that have the lowest CO <sub>2</sub> emission amongst the ones that have higher highway mileage than city mileage, are also hybrid cars, along with some smart cars.

Visualizations screenshot including legends

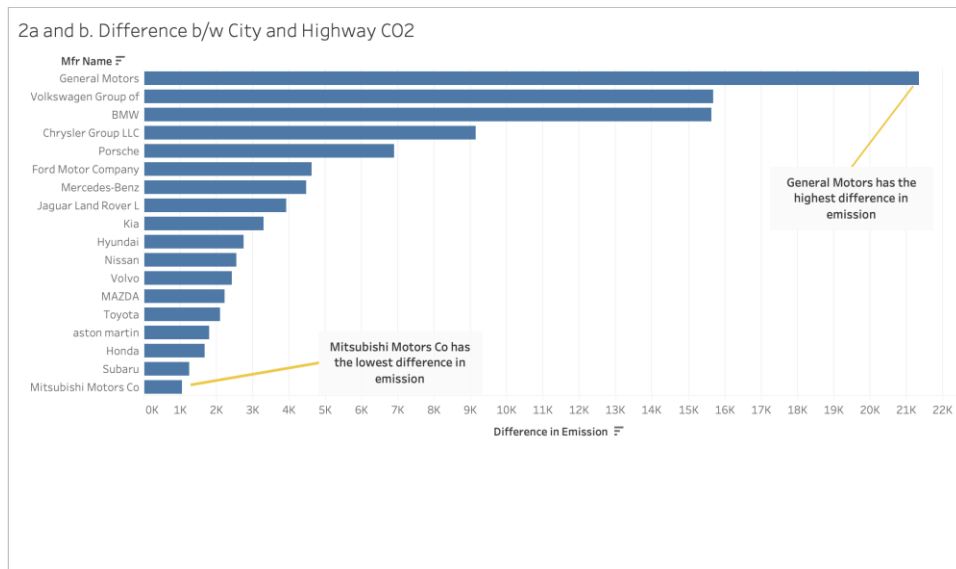
1a.



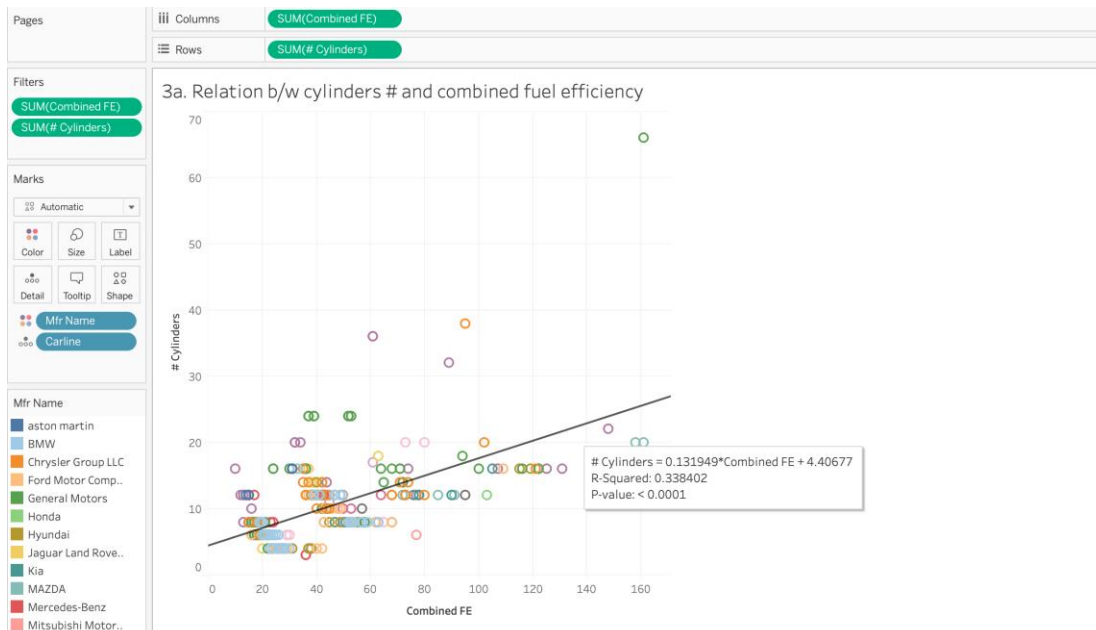
1b.



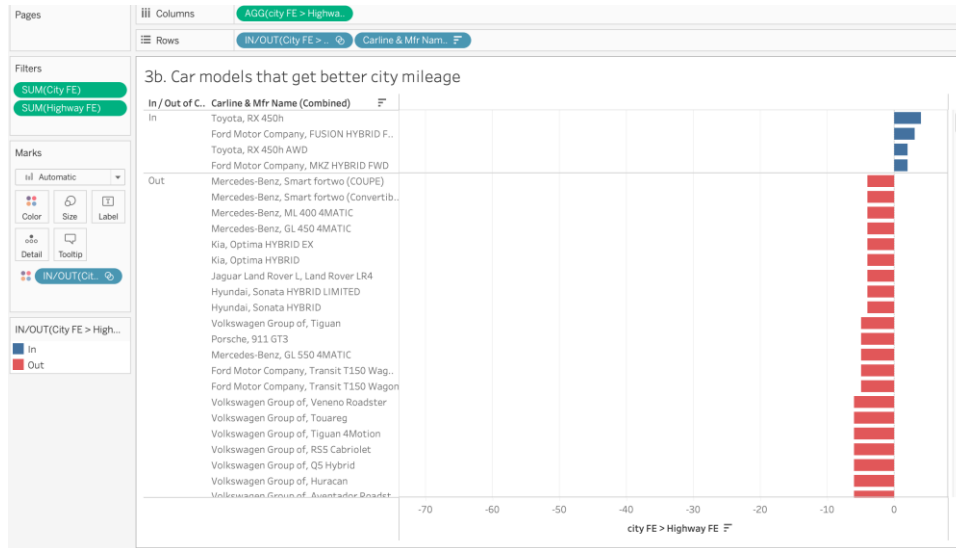
2a and 2b.



3a.



3b.



3c.

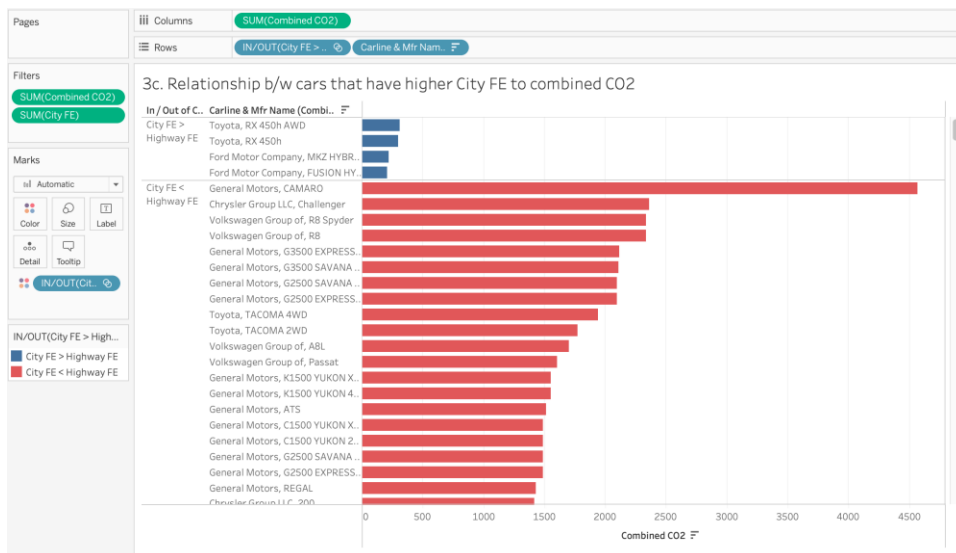


Fig.1. Relation between the cars that have higher city mileage than highway mileage to Combined CO<sub>2</sub> emission

### 3c. (Continued)

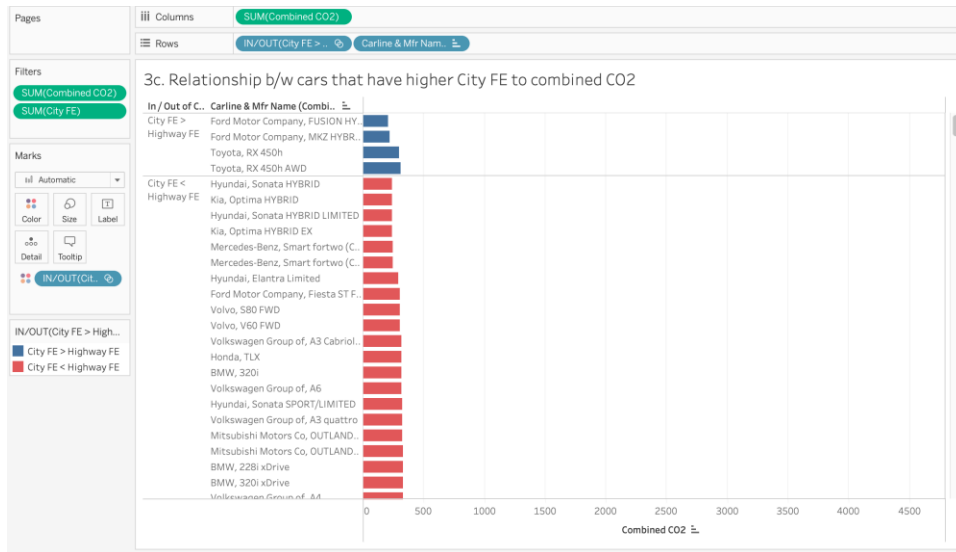


Fig.2. Shows the same table as Fig1. but sorted in Ascending order.