

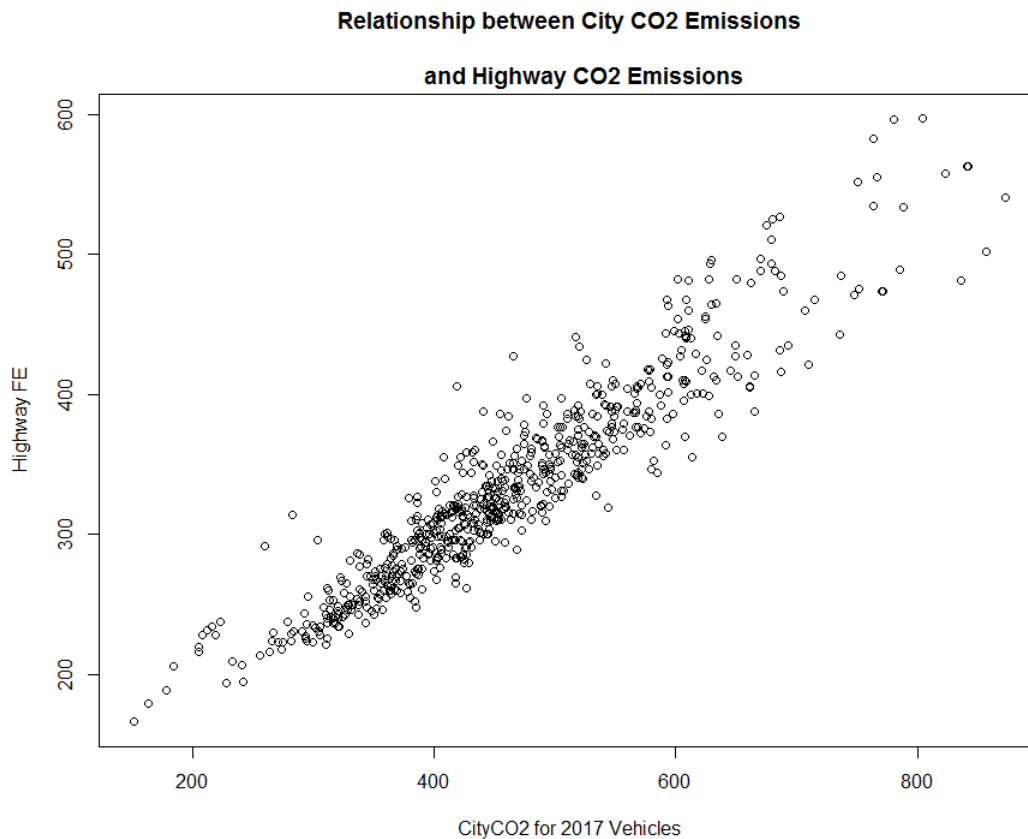
Stats 314, Data Analysis #5

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Part I

a



There seems to be a moderately strong, positive, linear relationship between City CO2 emissions and Highway CO2 emissions. There are a few positive outliers near the center of the scatterplot, and a balanced number of positive and negative outliers near the top right of the plot.

b

The correlation coefficient:

$$r = .9418$$

The coefficient measures the linear association strength between two quantitative variables. In this case, it is showing there is a fairly strong linear relationship between city CO2 emissions and highway CO2 emissions.

c

Residuals:

Min 1Q Median 3Q Max

-67.808 -14.695 -3.553 12.483 97.856

Coefficients:

Estimate Std. Error t value Pr(> |t|)

(Intercept) 66.325785 3.411020 19.45 < 2e-16 ***

CityCO2 0.577132 0.007082 81.50 < 2e-16 ***

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Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23.79 on 846 degrees of freedom

Multiple R-squared: 0.887, Adjusted R-squared: 0.8869

F-statistic: 6642 on 1 and 846 DF, p-value: < 2.2e-16

Least squared regression line: $\hat{y} = b_0 + b_1x$

$\hat{y} = 66.325 + .5771x$

d

i

$H_0: B_1 = 0$

$H_a: B_1 \neq 0$

ii

$TestStatistic = \frac{.5771-0}{.007082}$

81.488

$p - value = .00000025$

iii

The relationship between City CO2 emissions and Highway CO2 looks to be convincingly strong, with a correlation of .94. As City CO2 increases, highway CO2 also increases. The relationship is modeled by the least squares regression equation:

$averageemissions = 66.325 + .5771x$

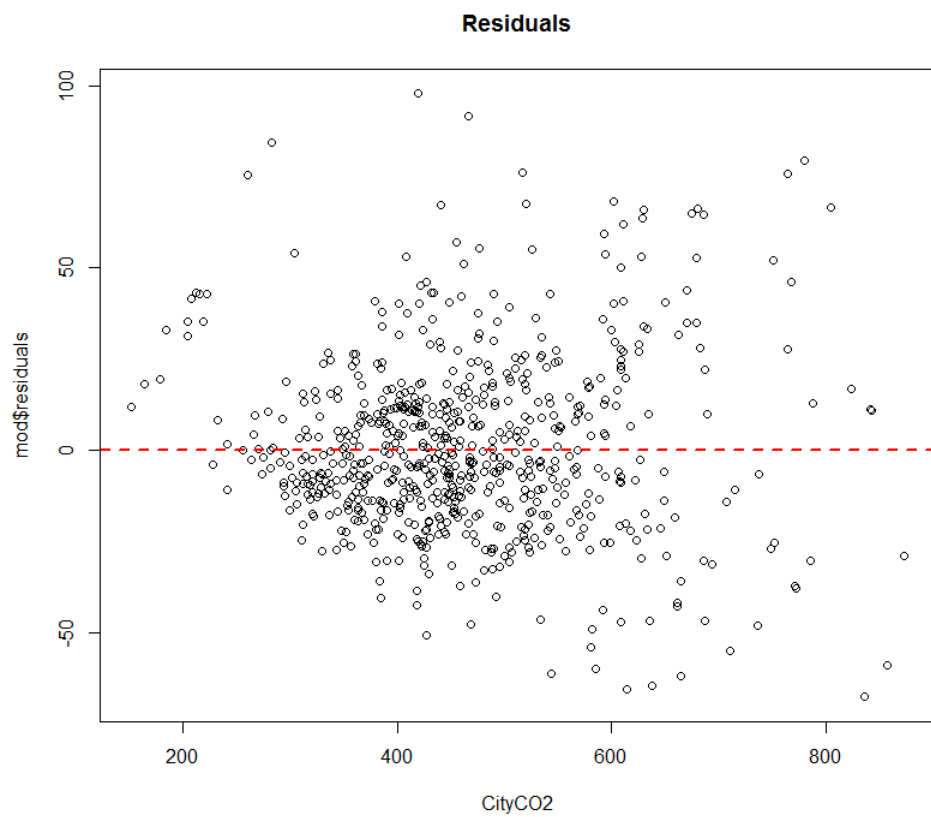
Average city CO2 emissions is a significant predictor for Highway CO2 emissions (t test stat = 81.5, df=846, and p-value .00000025).

The null hypothesis is rejected at a significant level of .01. The data supports the assumptions that increasing city emissions may increase highway CO2 emissions. The highway CO2 emissions are expected to increase .5771 for every 1 City CO2 emission increase.

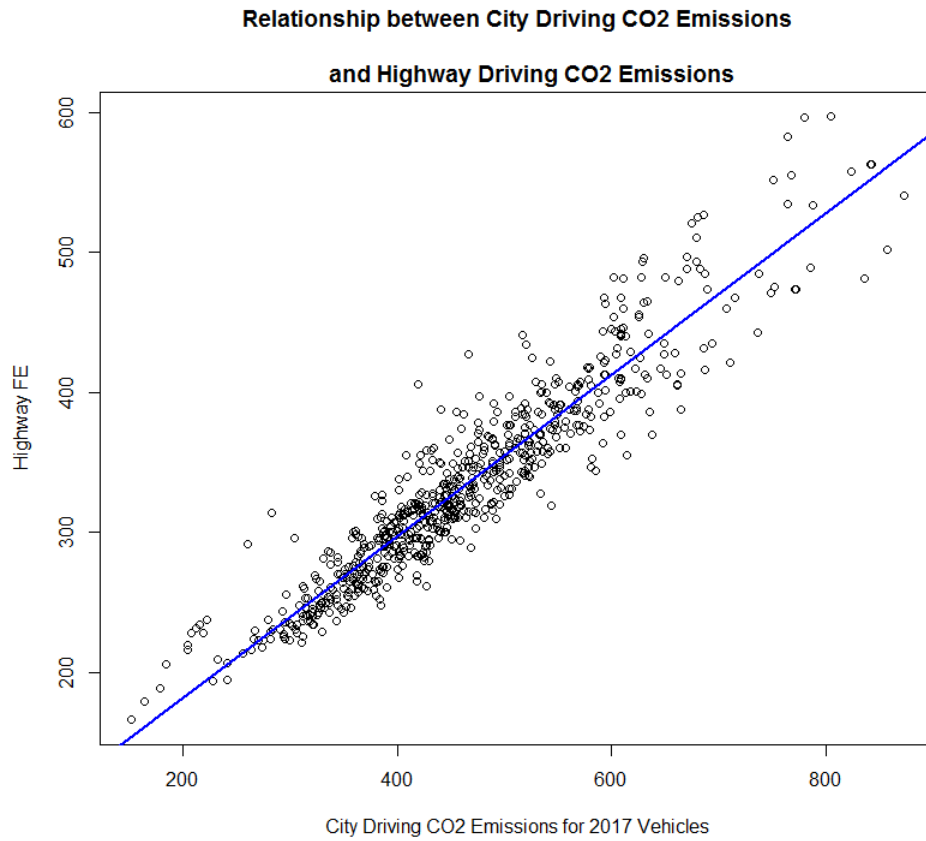
e

The slop shows how much the highway CO2 levels rise with the increase of city CO2 levels. With a 99% confidence interval from .5588 to .5954. That means with 99% confidence, we believe that the highway CO2 emissions increase by .5771 for each 1 increase in City CO2 emissions.

f



gg



Part II

- a
- b
- c
- d
- e

Part III

- a
- b
- c
- d
- e