STAT 4/579: STATISTICAL LEARNING   Quiz 2   Name: _____

Use the Prater gasoline data from Exercise 1.12.3 and the model $y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \beta_4 x_{i4}$ for this quiz. Using the matrix form of the linear model I want you to use the matrix commands in R to obtain the following. (Much of this you could **check** by using appropriate output from R's `lm` command.) The data are available from TAB9-3.DAT in

`http://www.stat.unm.edu/~fletcher/newavdr_data.zip`

1. Give $X'X$.

2. Give $(X'X)^{-1}$.

3. Give $\hat{\beta}'$, i.e. write $\hat{\beta}$ as a row vector

4. Give $[X\hat{\beta}]'$, i.e., write $\hat{Y}$ as a row vector. (Feel free to skip writing 20 of the middle values.)

5. Give $\hat{e}'$. (Feel free to skip writing 20 of the middle values.)

6. Give $SSE =$

7. Use a linear model program like R's `lm` to fit a weighted least squares model that places twice as much weight on the observations in the left half of Table 1.11. Give the weighted least squares estimate of β, say, $\hat{\beta}_w$.

8. How do the weighted and unweighted $\hat{\beta}$s differ?