4.3: Estimating Regression Coefficients in Multiple Linear Regression

Topic 4.3: Estimating Regression Coefficients in Multiple Linear Regression

Refer to the file below for an overview of matrices and basic operations.

mod4_matrix.pdf
Review of Matrices

Read Section 3.2 of your textbook. As you read, take notes on the following.

1. Write down the assumptions for a multiple linear regression model. You may state the assumptions using equations, and then describe what these equations mean. How do these assumptions differ from simple linear regression? Explain how you would assess if the regression assumptions are met.

2. Write down the multiple linear regression model using matrix notation. Be sure to write what each matrix is.

3. Write down the least-squares estimator of β.

4. Write down the hat matrix using matrix notation.

5. Write down the predicted / fitted values using matrix notation and using the hat matrix.

6. Write down the residuals using matrix notation and using the hat matrix.

7. Write down the expected value and variance of the least-squares estimator, $\hat{\beta}$.

8. Write down the formula for the estimated variance, $\hat{\sigma}^2$, of a multiple linear regression model. How does this differ from simple linear regression?