

## Homework 6

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### 1 EDA

### Feature Selection & Prediction

### 2 Backward Stepwise Regression

### 3 PCA

### 4 Random Forest Analysis

### 5 Table of Metrics

### 6 Prediction Interval

### 7 Polynomial Regression and Grid Search

### 8 Simple Linear Regression

In a simple linear regression with  $n$  observations:

$$y_i \approx \hat{\beta}_0 + \hat{\beta}_1 x_i \quad (1)$$

Prove the following:

$$\hat{\beta}_1 = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (2)$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x} \quad (3)$$

where  $\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$  and  $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$  are the sample mean.