NYU Stern

STAT-UB-3-Regression and Forecasting Models

Homework 3

1. **Perfect Relationship - Zero Correlation** - Consider the quadratic relationship:

i	x_i	y_i
1	-2	4
2	-1	1
3	0	0
4	1	1
5	2	4

a. Produce a graph of this data set;

b. Calculate the correlation coefficient and chack that it is equal to zero.

2. **Weighted Sums** Show that the estimate $\hat{\beta}_1$ **is a weighted sum of the observed responses** y_i, i.e., that

$$\hat{\beta}_1 = \sum_{i=1}^{n} \omega_i y_i$$

Hint: Consider the weights

$$\omega_i = \frac{x_i - \bar{x}}{SS_{xx}}$$

and note that

$$\sum_{i=1}^{n} \omega_i = 0$$

3. **Simple Linear Regression Model** - The file *thuesen* contains the blood glucose and short velocity measurements for 25 patients (note that the short velocity data for patient 17 is missing).

a. Fit a simple linear regression model to the data (use short velocity as the response);

b. Test the hypothesis that $\beta_1 = 0$;

c. Calculate the model's R^2;

d. Examine the residuals. Do you have confidence the linear regression model's assumptions hold?