MATH 5090 – Quiz 9
Due at 9 pm on Thursday, 16th April.

Consider the simple linear regression model with independent errors: $Y_i = \beta_0 + \beta_1 x_i + \epsilon_i$ for $\mathrm{E}(\epsilon_i) = 0$, $\mathrm{Var}(\epsilon_i) = \sigma^2$ for $i = 1, \ldots, n$.

1. Show that the least squares estimators of $\beta_0, \beta_1, \sigma^2$ minimize the sum of squared errors.

2. Let $d_i = \frac{1}{n} - \bar{x} b_i$ where $b_i = \frac{x_i - \bar{x}}{S_{XX}}$. Show that $\sum d_i^2 = \frac{\sum x_i^2}{n \sum (x_i - \bar{x})^2}$.