

## 2.1: Introduction to Simple Linear Regression

Dr. Bean - Stat 5100

(Review) What is the difference between a functional and a statistical relationship?

Functional:  $Y = f(X)$  (no scatter).

Statistical:  $Y = f(X) + \epsilon$  (scatter about the line)

(Review) What does it mean to be linear?

$$Y = \beta_0 + \sum_i \beta_i f(X_i)$$

If I start with  $n$  degrees of freedom, how many DF do I have left after calculating the residuals in the Toluca example?

$n - 2$  since I spent 1 to calculate  $b_0$  and another to calculate  $b_1$ .

Now suppose that my model equation was actually  $\hat{Y} = b_0 + b_1X_1 + b_2X_2$  how many DF would have left after calculating the residuals?

$n - 3$  since I spent 1 to calculate  $b_0$ , another to calculate  $b_1$ , and a third to calculate  $b_2$ .

In the Toluca Example (notes 2.1.1), what is our best estimate of the variance of the residuals?

Toluca Example:  $\hat{\sigma}^2 = 2383.72$