

# Exam SRM Notes

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test foo fighters

# Chapter 1 – Simple Linear Regression

**Equation 1.1.1 (SLR).**

$$y = \beta_0 + \beta_1 x + \epsilon$$

**Model assumptions.**

1. Each  $y_i$  is a r.v. while each  $x_i$  is a measured number.
2. Each  $\epsilon_i$  follows a normal distribution with mean 0 and variance  $\sigma^2$

**Equation 1.2.1 (Sum of squares).**

$$SS(\beta_0, \beta_1) = \sum_{i=1}^n [y_i - (\beta_0 + \beta_1 x_i)]^2$$

**Equation 1.2.2 ( $\beta_0$  and  $\beta_1$ ).**

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2}$$
$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

$$S_{xy} := \sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y}) = \sum_{i=1}^n x_i y_i - n\bar{x}\bar{y} \quad \text{and} \quad S_{xx} := \sum_{i=1}^n (x_i - \bar{x})^2 = \sum_{i=1}^n x_i^2 - n\bar{x}^2$$

**Note (Random errors and residuals)** Random errors are unobservable random variables, whereas residuals are the measured errors.

**Fact (Sum-to-zero constraints on residuals)**

1.  $\sum_{i=1}^n e_i = 0$
2.  $\sum_{i=1}^n x_i e_i = 0$

**Equation foo.**

*foofoo*

fasdf

**Equation fasdf.**

*fasf*

fasf