

Homework 2.

1. Chapter 2 (p89): 1, 22, 25.
2. *Mathematical Derivations.* Consider a linear regression without intercept:

$$y_i = \beta x_i + e_i,$$

for  $i = 1, \dots, N$ . Assume that  $e_i \stackrel{i.i.d.}{\sim} N(0, \sigma^2)$ . The sum of squares is

$$S(\beta) = \sum_{i=1}^N (y_i - \beta x_i)^2.$$

- (a) Find the **least squares estimator (LSE)** of  $\beta$ .
- (b) Find the sampling distribution of **the least squares estimator of  $\beta$  derived in (a)**.