Section #1

Topic covered:

- Properties of summations

Problem 1: Properties of summations

Prove the following properties of summations:

a. $$\sum_{i=1}^{n} \frac{X_i}{Y_i} \neq \frac{\sum_{i=1}^{n} X_i}{\sum_{i=1}^{n} Y_i}$$

b. Prove that given data on two variables X and Y, and the sample means $\bar{X}$ and $\bar{Y}$ the following holds:

$$\sum_{i=1}^{N} (X_i - \bar{X})\,(Y_i - \bar{Y}) = \sum_{i=1}^{N} X_i Y_i \; - \; N\,\bar{X}\bar{Y}$$

c. Prove that given a sample of size *N* with data on a variable X the following holds:

$$\sum_{i=1}^{N} [X_i\,(X_i - \bar{X})] = \sum_{i=1}^{N} (X_i - \bar{X})^2$$