1. For any set of realizations, \( \{x_1, \ldots, x_n\} \), from a random variable \( X \), verify the following equality:
\[
\sum_{i=1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} (x_i - \bar{x})x_i,
\]
where \( \bar{x} := \frac{1}{n} \sum_{i=1}^{n} x_i \).

2. In appendix A.3 of your textbook, verify that the partial derivatives of \( \text{RSS}(\beta_0, \beta_1) \) with respect to \( \beta_0 \) and \( \beta_1 \) are respectively given by
\[
\frac{\partial}{\partial \beta_0} \text{RSS}(\beta_0, \beta_1) = -2 \sum_{i=1}^{n} (y_i - \beta_0 - \beta_1 x_i),
\]
\[
\frac{\partial}{\partial \beta_1} \text{RSS}(\beta_0, \beta_1) = -2 \sum_{i=1}^{n} x_i (y_i - \beta_0 - \beta_1 x_i).
\]

3. Solve the two equations in (1) with respect to \( \beta_0 \) and \( \beta_1 \), in order to obtain the estimates,
\[
\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}, \quad \text{and} \quad \hat{\beta}_1 = \frac{\text{SXY}}{\text{SXX}},
\]
respectively; where \( \text{SXY} := \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y}) \) and \( \text{SXX} := \sum_{i=1}^{n} (x_i - \bar{x})^2 \).

4. Problem 1.2 from your textbook.

5. Problem 2.1 from your textbook. (This involves material that will be covered next week.)