1. Exercise 50 (a) and (b) page 537

2. Given the five pairs of \((x, y)\) values

\[
\begin{array}{c|ccccc}
  x & 1 & 3 & 5 & 7 & 9 \\
  y & 3 & 2 & 5 & 7 & 8 \\
\end{array}
\]

(a) Calculate the least squares estimates \(\hat{\beta}_0\) and \(\hat{\beta}_1\).

(b) Determine the least squares line.

(c) In addition to estimation errors caused by sampling variation, what added danger is there in estimating the mean value of the response when \(x = 20\)?

3. Consider the regression model

\[
Y = \beta_0 + \beta_1 x + \epsilon
\]

where \(\beta_0 = -1\) and \(\beta_1 = -2\) and the normal random variable \(\epsilon\) has mean 0 and variance 2.

(a) What is the mean of the response \(Y\) when \(x = 4\)?

(b) Will the response at \(x = 2\) always be larger than the response at \(x = 4\)? Explain.

4. Let \(X\) and \(Y\) have joint probability density function

\[
\frac{1}{\pi \sqrt{48}} e^{-\frac{1}{6}(x^2 - xy + y^2)}
\]

(a) Identify the parameters \(\mu_1, \sigma_1^2, \mu_2, \sigma_2^2\) and \(\rho\) in this bivariate normal distribution.

(b) Specify the conditional distribution of \(Y\) given \(X = x\). Also specify the regression of \(Y\) on \(x\). (this is the conditional expectation \(E[Y | X = x]\))

5. Exercise 59 (a), (b), and (c) page 547