

AM 166: Homework # 2 (due Thursday, Feb 22)

The book we refer to is Wackerly, Mendenhall & Scheaffer, *Mathematical Statistics with Applications* (6th Edition).

1. Read Chapter 11.
2. Solve problem 11.6. For this problem, you want to find the $\hat{\beta}_1$ that minimize the SSE. Note that for a quadratic function

$$f(\beta) = a\beta^2 + b\beta + c$$

with $a > 0$, it is minimized at the point $\hat{\beta} = -\frac{b}{2a}$.

3. Solve problem 11.8. Also calculate the SSE and S^2 .
4. Solve problem 11.22, 11.27.
5. This problem requires you use a software, any software you like (STATA, MatLab, SPlus, etc.) would be fine.
 - (a) Generate 100 independent samples from $N(0, \sigma^2)$ with $\sigma = 10$.
 - (b) Draw a histogram of the 100 samples you obtained from part (a).
 - (c) Generate 100 independent samples from $N(0, 1)$.
 - (d) Denote the 100 samples from part (a) as x_1, x_2, \dots, x_{100} . Regard them as explanatory variables.
 - (e) Denote the 100 samples from part (c) as z_1, z_2, \dots, z_{100} .
 - (f) Define for $n = 1, 2, \dots, 100$,
$$y_n = 2 + 0.5 * x_n + z_n$$
 - (g) Plot the graph $\{(x_1, y_1), (x_2, y_2), \dots, (x_{100}, y_{100})\}$.
 - (h) Fit the least square regression line, and plot it. Report $\hat{\beta}_0$, $\hat{\beta}_1$, and S^2 . Also report the 95% confidence intervals for $\hat{\beta}_0$ and $\hat{\beta}_1$.