Stat13 Homework 5

http://www.stat.ucla.edu/~dinov/courses_students.html

Suggested Solutions

(Throughout this document, CI means *confidence interval*)

Problem 6.5

a) SD = 3.06 mm, the same as estimated from 86 samples.

b) SE(mean) = $SD/\sqrt{n} = 3.06/\sqrt{500} = 0.13$mm

Problem 6.12

a) 95% CI for mean: $\hat{\mu} \pm t_{stat} \cdot SE(\hat{\mu}) = 28.7 \pm 2.571 \cdot 4.6/\sqrt{6} = (23.8, 33.6)$

b) μ =mean blood serum concentration of Gentamicin (1.5 hours after injection of 10 mg/kg body weight) in healthy three-year-old female Suffolk sheep.

c) No. The 95% refers to the percentage (in a meta-experiment) of confidence intervals that would contain μ. Since the width of a confidence interval depends on n, the percentage of observations contained in the confidence interval also depends on n, and would be very small if n were large.

Problem 6.14

False, because the confidence interval concerns the mean of the population. It does not tell us where individual data points lie.

Problem 6.42

$$\tilde{p} = \frac{14 + 1.92}{71 + 3.84} = 0.213, \quad SE(\tilde{p}) = \sqrt{\frac{\tilde{p}(1-\tilde{p})}{n + 3.84}} = 0.047$$

95% CI: $\tilde{p} \pm 1.96 \cdot SE(\tilde{p}) = 0.213 \pm 1.96 \cdot 0.047 = (0.120, 0.306)$

Problem 6.56

a) 99% CI: $28.86 \pm 2.576(4.24/\sqrt{1353}) = (28.56, 29.16)$

b) No, because 29.5 is outside of the 99% CI.

Problem 6.60

The CI should be (6.2,7.4). The CI is an interval estimate of the population mean. The data only take on integer values, but the means of the population need not be an integer (and probably is not).

Problem 6.69

The required n must satisfy the inequality:

$\sqrt{\frac{0.45 \cdot 0.55}{n + 3.84}} \le 0.02$. This implies: $n \ge 615$

Problem 6.70

$\widetilde{p} \cdot (1 - \widetilde{p})$ is largest when $\widetilde{p} = 0.5$. Therefore, the required n should satisfy:

$\sqrt{\frac{0.5 \cdot 0.5}{n + 3.84}} \leq 0.02$. This implies: $n \geq 621$