Homework 5

Question 6.10

This problems asks us to compute the standard error and confidence interval for the mean weight of chick embryo glands after 14 days of incubation.

a) For $\bar{y} = 31.720$, $s = 8.729$ and $n = 5$, the standard error of the mean is:

$$SE_{\bar{y}} = \frac{s}{\sqrt{n}} = \frac{8.729}{\sqrt{5}} = 3.904$$

b) The degrees of freedom are $n - 1 = 5 - 1 = 4$. The critical value is $t_{.05} = 2.132$. The 90% confidence interval is:

$$\bar{y} \pm t_{.05}\frac{s}{\sqrt{n}} = 31.720 \pm 2.132\left(\frac{8.729}{\sqrt{5}}\right) = (23.4, 40.0)$$

Question 6.13

This problem asks us to interpret a confidence interval for a study of deer mouse tails.

a) This statement is false. The confidence interval allows us to make inference concerning the mean of the entire population. We *know* for certain $59.77 \leq \bar{y} \leq 61.09$.

b) This statement is true.

Question 6.14

a) This statement is false. The confidence interval concerns the *mean* of the population. It does not tell us where individual data points lie.

Question 6.41

This problem asks us to construct and interpret a confidence interval for the probability of interference in cellular telephones.

a) For this problem $y = (959)(.157) = 150.56$ so y must be 151. Thus:

$$\tilde{p} = \frac{151 + .5(1.645^2)}{(959 + 1.645^2)} = .158 \text{ and } SE = \sqrt{\frac{.158(1 - .158)}{959 + 1.645^2}} = .012$$

and the 90% confidence interval is $.158 \pm (1.645)(.012) = (.138, .178)$.

b) This is the confidence interval for the probability of interference with the pacemaker for that type of cellular telephone.

Question 6.55

This problem asks us to construct and interpret a confidence interval for the average number of puffs for Drosophila.

a) The confidence interval is $4.3 \pm (2.093)(2.03/\sqrt{20}) = (3.35, 5.25)$.

b) The confidence interval is not consistent with the hypothesis because 30 is not in the interval.

Question 6.61

This problem investigates the natural variation in blood chemistry. We are asked to construct and interpret a confidence interval for average serum potassium concentration in the blood of healthy women.

a) The standard error for the mean is $.42/\sqrt{84}$.

b) Shown on final page.

c) The confidence interval is $4.36 \pm (1.984)(.04583) = (4.269, 4.451)$

d) We are 95% confident that the average serum potassium concentration in the blood of all healthy women is between 4.269 and 4.451.

Question 6.68

The problem asks us to construct and interpret a confidence interval for the average hemoglobin levels in men over the age of 70.

a) For this problem $\bar{y} = 145.3$, $s = 12.87$ and $SE = 12.87/\sqrt{1139} = .381$. The confidence interval is $145.3 \pm (1.96)(.381) = (144.55, 146.05)$.

b) No. The obtained 95% confidence interval is a confidence interval for the population mean hemoglobin level. It does not give limits for individual data points.

c) No. Same argument as part (b).

Question 6.69

This problem asks us to determine the number of students needed to create an estimate which has less than or equal to 2 percentage points of error.

a) The required n must satisfy the inequality:

$$\sqrt{\frac{(.45)(.55)}{n+4}} \leq .02$$

Therefore $n \geq 615$.

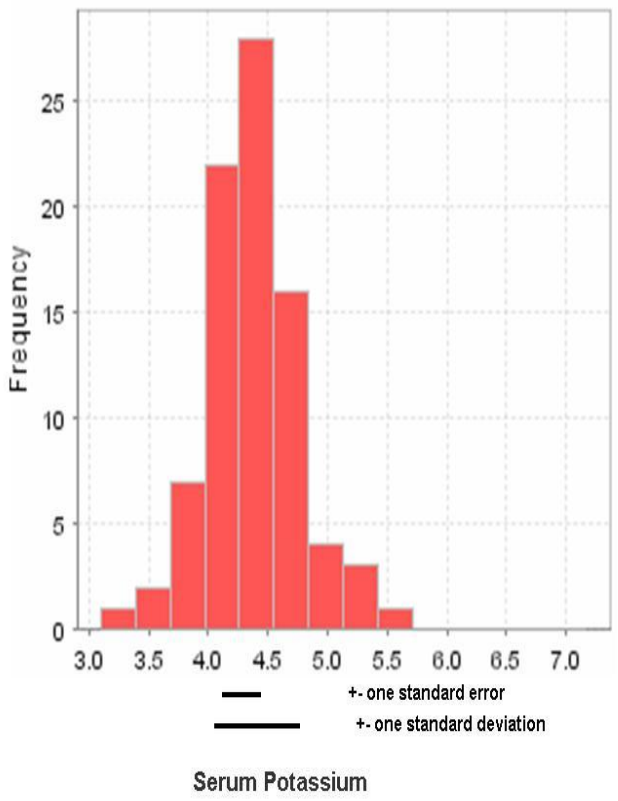

Figure 1: Figure for Problem 6.61 Part(b)