CHAPTER 6
Confidence Intervals

• **6.2.1** (a) $\bar{y}$ = 1269; s = 145; n = 8.
The standard error of the mean is

$$SE_{\bar{Y}} = \frac{s}{\sqrt{n}} = \frac{145}{\sqrt{8}} = 51.3 \text{ ng/gm.}$$

(b) $\bar{y}$ = 1269; s = 145; n = 30.
The standard error of the mean is

$$SE_{\bar{Y}} = \frac{s}{\sqrt{n}} = \frac{145}{\sqrt{30}} = 26.5 \text{ ng/gm.}$$

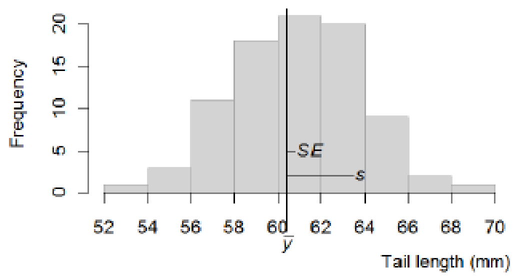
6.2.2 (a) $15/\sqrt{25} = 3.0$ cm

(b) $15/\sqrt{100} = 1.5$ cm

6.2.3 $\bar{y}$= 9.520; s = 1.429; SE =$1.429/\sqrt{5} = 0.6391 \approx 0.64$ gm/kg.

6.2.4 (a) $3.06/\sqrt{86} = 0.33$ mm

(b)



6.2.5 (a) We would predict the SD of the new measurements to be about 3 mm because this is our estimate (based on Exercise 6.2.4) of the population SD.

(b) We would expect the SE of the new measurements to be $3/\sqrt{500} \approx 0.13$ mm.

6.2.6 To convey the homogeneity of the group of rats, the 10 gm should be the SD, since the SD describes variability among the rats. (The SE describes the precision of the sample *mean*, but this depends on the sample size.)

6.2.7 (a) the SE
(b) the SD
(c) the SE

6.2.8 No. The SE measures variability in a sample mean. If we want to model variability in single observations we need to use the SD, not the SE.

6.2.9 The SE is the SD divided by the square root of the sample size, so SE < SD. Thus 64.9 is the SE and 251.2 is the SD.

6.3.1 and 6.3.2 See Section III of this Manual.

• **6.3.3** (a) $\bar{y}$= 31.720 mg; s = 8.729 mg; n = 5.
The standard error of the mean is

$$SE_{\bar{Y}} = \frac{s}{\sqrt{n}} = \frac{8.7}{\sqrt{5}} = 3.89 \approx 3.9 \text{ mg.}$$

(b) The degrees of freedom are n - 1 = 5 - 1 = 4. The critical value is $t_{0.05} = 2.132$. The 90% confidence interval for μ is

$$\bar{y} \pm t_{0.05}\frac{s}{\sqrt{n}}$$

$$31.7 \pm 2.132\left(\frac{8.7}{\sqrt{5}}\right)$$

(23.4,40.0) or 23.4 < μ < 40.0 mg.

6.3.4 (a) The degrees of freedom are n - 1 = 5 - 1 = 4. The critical value is $t_{0.025} = 2.776$. The 95% confidence interval for μ is

$$\bar{y} \pm t_{0.025}\frac{s}{\sqrt{n}}$$

$$31.7 \pm 2.776\left(\frac{8.7}{\sqrt{5}}\right)$$

(20.9,42.5) or 20.9 < μ < 42.5 mg.

(b) We are 95% confident that the mean thymus gland weight in the population of chick embryos is between 20.9 and 42.5 mg.

6.3.5 (a) $\bar{y}$= 28.7; s = 4.6;SE = $4.6/\sqrt{6} = 1.88 \approx 1.9$ μg/ml.

28.7 ± (2.571)(1.9)

(23.8,33.6) or 23.8 < μ < 33.6 μg/ml.

(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.