Chap. 6

3.

a. We use the sample mean, $\bar{x} = 1.3481$.

b. Because we assume normality, the mean = median, so we also use the sample mean $\bar{x} = 1.3481$. We could also easily use the sample median.

c. We use the 90[th] percentile of the sample: $\hat{\mu} + (1.28)\hat{\sigma} = \bar{x} + 1.28s = 1.3481 + (1.28)(.3385) = 1.7814$.

d. Since we can assume normality,

$$P(X < 1.5) \approx P\left(Z < \frac{1.5 - \bar{x}}{s}\right) = P\left(Z < \frac{1.5 - 1.3481}{.3385}\right) = P(Z < .45) = .6736.$$

e. The estimated standard error of $\bar{x} = \frac{\hat{\sigma}}{\sqrt{n}} = \frac{s}{\sqrt{n}} = \frac{.3385}{\sqrt{16}} = .0846$.

9.

a. $E(\bar{X}) = \mu = E(X)$, so $\bar{X}$ is an unbiased estimator for the Poisson parameter μ. Since $n = 150$,

$$\hat{\mu} = \bar{x} = \frac{\Sigma x_i}{n} = \frac{(0)(18) + (1)(37) + \ldots + (7)(1)}{150} = \frac{317}{150} = 2.11.$$

b. $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{\sqrt{\mu}}{\sqrt{n}}$, so the estimated standard error is $\sqrt{\frac{\hat{\mu}}{n}} = \frac{\sqrt{2.11}}{\sqrt{150}} = .119$.

Chap. 7

1.

a. $z_{\alpha/2} = 2.81$ implies that $\alpha/2 = 1 - \Phi(2.81) = .0025$, so $\alpha = .005$ and the confidence level is $100(1-\alpha)\% = 99.5\%$.

b. $z_{\alpha/2} = 1.44$ implies that $\alpha = 2[1 - \Phi(1.44)] = .15$, and the confidence level is $100(1-\alpha)\% = 85\%$.

c. 99.7% confidence implies that $\alpha = .003$, $\alpha/2 = .0015$, and $z_{.0015} = 2.96$. (Look for cumulative area equal to $1 - .0015 = .9985$ in the main body of table A.3.) Or, just use $z \approx 3$ by the empirical rule.

d. 75% confidence implies $\alpha = .25$, $\alpha/2 = .125$, and $z_{.125} = 1.15$.

2.

a. The sample mean is the center of the interval, so $\bar{x} = \dfrac{114.4 + 115.6}{2} = 115$.

b. The interval (114.4, 115.6) has the 90% confidence level. The higher confidence level will produce a wider interval.

5.

a. $4.85 \pm \dfrac{(1.96)(.75)}{\sqrt{20}} = 4.85 \pm .33 = (4.52, 5.18)$.

b. $z_{\alpha/2} = z.01 = 2.33$, so the interval is $4.56 \pm \dfrac{(2.33)(.75)}{\sqrt{16}} = (4.12, 5.00)$.

c. $n = \left[\dfrac{2(1.96)(.75)}{.40}\right]^2 = 54.02 \nearrow 55$.

d. Width $w = 2(.2) = .4$, so $n = \left[\dfrac{2(2.58)(.75)}{.4}\right]^2 = 93.61 \nearrow 94$.

20. Because the sample size is so large, the simpler formula (7.11) for the confidence interval for p is sufficient:

$$.15 \pm 2.58\sqrt{\frac{(.15)(.85)}{4722}} = .15 \pm .013 = (.137, .163).$$