HW6 Solution File

The total should be 60 pt. Q-n 1 is 10 pt and 2/2/3/3

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 $z_{.125} = 1.15$.

Q-n 2 is 10 pt and 5/5

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.

Q-n 13 is 10 pt and 5/5.

13.

a. $\bar{x} \pm z_{.025}\dfrac{s}{\sqrt{n}} = 654.16 \pm 1.96\dfrac{164.43}{\sqrt{50}} = (608.58, 699.74)$. We are 95% confident that the true average CO_2 level in this population of homes with gas cooking appliances is between 608.58ppm and 699.74ppm

b. $w = 50 = \dfrac{2(1.96)(175)}{\sqrt{n}} \Rightarrow \sqrt{n} = \dfrac{2(1.96)(175)}{50} = 13.72 \Rightarrow n = (13.72)^2 = 188.24$, which rounds up to 189.

Q-n 19 is 10 pt.

19. $\hat{p} = \dfrac{201}{356} = .5646$; We calculate a 95% confidence interval for the proportion of all dies that pass the probe:

$$\frac{.5646 + \dfrac{(1.96)^2}{2(356)} \pm 1.96\sqrt{\dfrac{(.5646)(.4354)}{356} + \dfrac{(1.96)^2}{4(356)^2}}}{1 + \dfrac{(1.96)^2}{356}} = \frac{.5700 \pm .0518}{1.01079} = (.513, .615)$$

. The simpler CI formula (7.11) gives $.5646 \pm 1.96\sqrt{\dfrac{.5646(.4354)}{356}} = (.513, .616)$, which is almost identical.

Q-n 29 is 10 pt and 1/1/2/2/2/2

29.

a. $t_{.025,10} = 2.228$

b. $t_{.025,20} = 2.086$

c. $t_{.005,20} = 2.845$

d. $t_{.005,50} = 2.678$

e. $t_{.01,25} = 2.485$

f. $-t_{.025,5} = -2.571$

Q-n 32 is 10 pt

32. We have $n = 20$, $\overline{x} = 1584$, and $s = 607$; the critical value is $t_{.005,20-1} = t_{.005,19} = 2.861$. The resulting 99% CI for μ is

$$1584 \pm 2.861 \frac{607}{\sqrt{20}} = 1584 \pm 388.3 = (1195.7,\ 1972.3)$$

We are 99% confident that the true average number of cycles required to break this type of condom is between 1195.7 cycles and 1972.3 cycles.