Chapter 6 Review #2 Worksheet **Prob/Stats** **Name** Key

Show All Work!!!!

1. Find the critical value z_c that corresponds to a 91% confidence level.

$\frac{1-.91}{2} = \frac{.09}{2} = .0450 \quad z_c = \boxed{1.70}$

2. The following confidence interval is obtained for a population proportion, p: (0.505, 0.545). Use this CI to find the point estimate $\hat{p}$ and the margin of error E.

$\hat{p} = \frac{.505+.545}{2} = \boxed{.525} \quad E = .525 - .505 = \boxed{.02}$

3. In a clinical test with 3300 subjects, 660 showed improvement from the treatment. Find the margin of error for the 99% confidence interval used to estimate the population proportion. (3 decimal places)

$\frac{1-.99}{2} = \frac{.01}{2} = .0050 \quad \hat{p} = \frac{660}{3300} = .2 \quad E = 2.575\sqrt{\frac{.2 \cdot .8}{3300}} = \boxed{.018}$

$z_c = 2.575 \quad \hat{q} = .8$

4. Use the given information to construct a confidence interval for the population proportion. (3 decimal places)

$n = 97$, $x = 46$, $c = .98$

$\hat{p} = \frac{46}{97} = .474 \quad \hat{q} = 1 - .474 = .526$

$\frac{1-.98}{2} = \frac{.02}{2} = .01 \quad E = 2.33 \cdot \sqrt{\frac{.474 \cdot .526}{97}} = .118$

$z_c = 2.33 \quad .474 \pm .118 < {.356 \atop .592}$

With 98% confidence, we can say the population proportion is between 35.6% and 59.2%

Don't need – didn't say to interpret

5. Find the minimum sample size required to estimate the population proportion in order to be 98% confident that the sample proportion will not differ from the true proportion by more than 0.5%.

$C = .98 \quad E = .005$

$n = (.5)(.5)\left(\frac{2.33}{.005}\right)^2 = \boxed{54289}$

$\frac{1-.98}{2} = \frac{.02}{2} = .01 \quad z_c = 2.33$

$\hat{p}$ & $\hat{q}$ are unknown

6. Find the minimum sample size required to estimate the population proportion in order to be 99% confident that the sample proportion will not differ from the true proportion by more than 5%. Assume previous studies indicate the sample proportion is 15%.

$C = .99 \quad E = .05$

$\frac{1-.99}{2} = \frac{.01}{2} = .0050 \quad \hat{p} = .15 \quad n = .15(.85)\left(\frac{2.575}{.05}\right)^2 = 338.1\ldots$

$z_c = 2.575 \quad \hat{q} = 1 - .15 = .85 \quad \boxed{n = 339}$

7. When 319 college students are randomly selected and surveyed, it is found that 120 own a car. Find a 99% confidence interval for the true proportion of all college students who own a car. Interpret your results. (3 decimal places)

$C = .99 \quad \hat{p} = \frac{120}{319} = .376 \quad E = 2.575\sqrt{\frac{.376 \cdot .624}{319}} = .070$

$z = 2.575 \quad \hat{q} = 1 - .376 = .624 \quad .376 \pm .070 < {.446 \atop .306}$

With 99% confidence, we can say the true proportion of all college students who own a car is between 30.6% and 44.6%.

8. Find the margin of error for a 99% confidence level for college students' annual earnings given that the sample size is 76, the sample mean is \$3016, and the population standard deviation is \$872.

σ (2 dec. places)

$c = .99$ $n = 76$

$z_c = 2.575$ $\bar{x} = 3016$ $E = 2.575 \cdot \frac{872}{\sqrt{76}} = \$257.57$

$\sigma = 872$

9. A random sample of 130 full-grown lobsters had a mean weight of 21 ounces and a standard deviation of 3.0 ounces. Construct a 98% CI for the population mean. Interpret the results. (1 dec. place

$\bar{x} = 21$ $s = 3$ $n = 130$

$E = 2.364 \cdot \frac{3}{\sqrt{130}} = .6$

$c = .98$ $d.f = 129$ So we have to use 100

$t_c = 2.364$

$21 \pm .6 <$ 20.4, 21.6

With 98% confidence, we can say that the pop. mean weight for full grow lobsters is between 20.4 ounces and 21.6 ounces.

10. Thirty randomly selected students took the calculus final and the sample mean was 83. From previous studies it is known that the population standard deviation was 13.5. Construct a 99% CI for the population mean. Interpret the results. (1 dec. place)

$n = 30$ $\bar{x} = 83$ $\sigma = 13.5$

$83 \pm 6.3 <$ 76.7, 89.3

$c = .99$

$z_c = 2.575$ $E = 2.575 \cdot \frac{13.5}{\sqrt{30}} = 6.3$

With 99% confidence, we can say the mean score for all students that took the calculus final is between 76.7 and 89.3.

11. Of 88 adults selected randomly from one town, 68 have health insurance. Find a 90% confidence interval for the true proportion of all adults in the town who have health insurance. Interpret the results. (3 dec. places)

$n = 88$ $x = 68$ $\hat{p} = \frac{68}{88} = .773$ $E = 1.645 \sqrt{\frac{.773 \cdot .227}{88}} = .073$

$\hat{q} = 1 - .773 = .227$

$c = .90$

$.773 \pm .073 <$ .7, .846

$\frac{1 - .9}{2} = \frac{.1}{2} = .0500$

$z_c = 1.645$

With 90% confidence, we can say 70% to 84.6% of all adults in the town have health insurance.