

**QUIZ 4 (CHAPTER 7)**

MATH 119 – FALL 2012 – KUNIYUKI  
105 POINTS TOTAL, BUT 100 POINTS = 100%

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).

Box in your final answers!

No notes or books allowed. A scientific calculator is allowed.

You may detach the attached tables and write on them. Turn in the tables with your test, but any work written on them will not be graded.

- Do not leave “+”, “-”, or “±” in your final confidence intervals; write the lower limit and upper limit of each interval, as we have done in class. Avoid rounding until you write the simplified margin of error or your final answer. Then, round to the same number of decimal places as the given value of  $\bar{x}$ ,  $s$ , or  $s^2$ . If you want to round in the middle of a problem, round to at least five significant digits.
- (We're assuming that the population of interest is much larger than the sample, so there is no need to use a finite population correction factor. Do not use continuity corrections.)

- 1) We want to conduct a study to estimate the mean height of adult American actresses. We want to have 92% confidence that the resulting sample mean will be within 0.3 inches of the true population mean for all adult American actresses. Assuming that the population standard deviation is 2.5 inches (which is the standard deviation for all American women, according to one study), how large should the sample be? Use the formula:

$$n = \left\lceil \left( \frac{z_{\alpha/2} \sigma}{E} \right)^2 \right\rceil$$

(8 points)

2) Assume that the amounts of saturated fat in McWendy's Fried Egg Cheeseburgers are approximately normally distributed. We take a random sample of 26 McWendy's Fried Egg Cheeseburgers, and we find that the sample mean for the amounts of saturated fat is 50.0 grams, and the sample standard deviation is 4.2 grams. (43 points total)

a) Give a 99% confidence interval for the mean amount of saturated fat in McWendy's Fried Egg Cheeseburgers. Use the  $t$  table. (18 points)

b) Interpret your answer in part a), as we have done in class. (5 points)

c) Give a 90% confidence interval for the population standard deviation of the amounts of saturated fat in McWendy's Fried Egg Cheeseburgers.

Use the formula:

$$\sqrt{\frac{(n-1)s^2}{\chi_R^2}} < \sigma < \sqrt{\frac{(n-1)s^2}{\chi_L^2}}$$

(15 points)

d) Interpret your answer in part c), as we have done in class. (5 points)

3) The nation of Fredonia conducted a census five years ago. The mean income of Fredonian adults that year was \$17,000 in Fredonian dollars, and the standard deviation was \$3,500. Since then, American outsourcing has brought greater prosperity to Fredonia. We want to know the mean income of Fredonian adults now. We assume that the annual incomes of Fredonian adults have a standard deviation of \$3,500 (just as before). We randomly sample 150 Fredonian adults, and their sample mean annual income is \$33,000 in Fredonian dollars. Give a 98% confidence interval for the population mean annual income of Fredonian adults now. Use the  $z$  table. (18 points)

4) In a poll taken shortly before the elections, a polling firm obtained a random sample of 600 likely voters in Minnesota. Of the 600 sampled voters, 390 said that they would vote to reelect Senator Amy Klobuchar. Based on the methods we have used in class, the firm found a 95% confidence interval for the true proportion of likely voters in Minnesota who would vote to reelect Senator Klobuchar. Find that 95% confidence interval. Your sample proportion and limits must be rounded to four decimal places of accuracy. You may assume that the normal approximation to the binomial distribution can be applied without showing that. Do not use continuity corrections. Use the  $z$  table. Use the formula:

$$p = \hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

(20 points)

- 5) We want to know the proportion of American adults who will get “nasty side effects” if they take our new drug, Makusik. We will take a random sample of American adults to participate in our survey. We want to have 99% confidence that the resulting sample proportion will be no more than 4% away from the true proportion for the population. How large should the sample be? Be conservative; we have no idea what the sample proportion will be. Use the formula:

$$n = \left\lceil \frac{(z_{\alpha/2})^2 \hat{p}\hat{q}}{E^2} \right\rceil$$

(10 points)

- 6) Results from a sample are used to construct a 95% confidence interval for a population mean of a product line’s weights. The confidence interval is given by: 50 pounds  $< \mu < 90$  pounds . Assume that the interval was constructed using the methods we have used in class. (6 points total)

a) What is the sample mean? (3 points)

b) What is the margin of error? (3 points)