

QUIZ 4 (CHAPTER 7)**MATH 119 – SPRING 2013 – 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 I.Q. of a pop singer's fans. We want to have 96% confidence that the resulting sample mean will be within 2.5 I.Q. points of the true population mean for all of the singer's fans. Assuming that the population standard deviation is 15 points (which is the standard deviation for all Americans; we are probably being conservative), 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) The students in a huge university lecture class take a test. Assume that their test scores will be approximately normally distributed. After the students leave the lecture hall, a teaching assistant randomly samples eight tests and grades them. The sample mean is 61.5 points, and the sample standard deviation is 3.7 points. (43 points total for a)-d) below)

a) Give a 95% confidence interval for the mean test score for the entire class after all the exams are graded. Use the t table. (18 points)

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

c) Give a 99% confidence interval for the population standard deviation of the test scores for the entire class. 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) Body temperatures are approximately normally distributed with mean $98.20^\circ F$ and standard deviation $0.62^\circ F$. Some anthropologists are studying the body temperatures of people living on a large island. We assume that the body temperatures of these islanders have a standard deviation of $0.62^\circ F$ (just as before; this may be conservative). We randomly sample 70 of these islanders and take their body temperature, and their sample mean body temperature is $98.50^\circ F$. Give a 94% confidence interval for the population mean body temperature of the islanders. Use the z table. (18 points)

4) We are conducting a poll using a random sample of 950 American adults. Among these selected American adults, 600 believe that military service is more stressful than most other jobs. Find a 95% confidence interval for the true proportion of American adults who believe that military service is more stressful than most other jobs. 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 *South Park* viewers who would like to see Kenny die in the next episode. We will take a random sample of *South Park* viewers to participate in our survey. We want to have 90% confidence that the resulting sample proportion will be no more than 5% 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 both 95% and 99% confidence intervals for a population mean of women's heights in a country. We assume that those heights are approximately normally distributed. Assume that the intervals are constructed using the methods we have used in class.

(6 points total)

a) Which of the following is true? Box in one: (3 points)

- i) The center of the 99% confidence interval is less than the center of the 95% confidence interval.
- ii) The center of the 99% confidence interval is greater than the center of the 95% confidence interval.
- iii) The center of the 99% confidence interval is the same as the center of the 95% confidence interval.

b) Which of the following is true? Box in one: (3 points)

- i) The margin of error of the 99% confidence interval is less than the margin of error of the 95% confidence interval.
- ii) The margin of error of the 99% confidence interval is greater than the margin of error of the 95% confidence interval.
- iii) The margin of error of the 99% confidence interval is the same as the margin of error of the 95% confidence interval.