

Math 153 - Quiz 12

November 30, 2017

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (6 points) U.S. fuel economy standards require an average fuel economy of 35.5 mpg for cars. A company takes a random sample of 8 of its cars and determines their fuel economies: 34.5, 35.6, 34.3, 34.5, 35.2, 35.5, 37.1, 34.4.

(a) Find a 95% confidence interval estimate for the population mean fuel economy.

TInterval w/ Data \Rightarrow (34.347, 35.928)

$$\bar{x} = 35.1375 \text{ mpg}$$

(b) Give an interpretation of your interval in a complete sentence.

WE ARE 95% CONFIDENT THAT THE POP. MEAN FUEL ECONOMY FOR THE FLEET IS BETWEEN 34.3 mpg AND 35.9 mpg.

(c) Is it reasonable to assume the company's fleet is meeting the government standards?

No, SINCE OUR CONFIDENCE INTERVAL CONTAINS FUEL ECONOMIES LESS THAN 35.5 mpg, WE CANNOT EXPECT (WITH ANY CONFIDENCE) THE MEAN TO MEET OR EXCEED 35.5.

(d) What assumption must be made if we expect the confidence interval estimate to be accurate?

WE MUST ASSUME THE POPULATION OF FUEL ECONOMIES IS NORMALLY DISTRIBUTED.

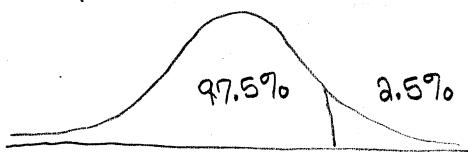
2. (2 points) A confidence interval for a certain population mean is given by (12.362, 13.008). Determine \bar{x} and E .

$$\bar{x} = \frac{12.362 + 13.008}{2} = 12.685$$

$$E = 12.685 - 12.362 = 0.323$$

3. (2 points) What sample size is required in order to compute a 95% confidence interval estimate for a population proportion if no prior estimates for the proportion are known?

$$n = \frac{(z_{\alpha/2})^2 (0.25)}{E^2} = \frac{(1.96)^2 (0.25)}{E^2} = \frac{0.9604}{E^2}$$



$$z_{\alpha/2} = \text{invNorm}(0.975) = 1.96$$

eg. If $E = 2\% \Rightarrow$

$$n \approx 2401$$