

Math 498

Quiz 4

You should use the inside front and back covers of the textbook as a cheat sheet. You also should use the tables in the back of the textbook.

Justify all answers with neat and organized work. Clearly indicate your answers. 40 points possible.

1. (16 pts.) Six color picture tubes of a certain type are tested independently for length of life, with results 1213, 1602, 1418, 1539, 1592, and 1334 hours. (Assume that the population has an approximately normal distribution.)

(a) Find a 95% confidence interval for the mean lifetime.

(b) Find a 95% confidence interval for the true standard deviation.

2. (8 pts.) A manufacturer is considering installation of a new cost-saving procedure for producing television tuners. There is some question about product quality for the new procedure. A random sample of 610 tuners produced by the new method contains 35 defectives, while 730 tuners produced by the old procedure yields 31 defectives. Find a 95% confidence interval for the difference in defective rates for the two procedures.

3. (16 pts.) Two identical jars, jar A and jar B , contain 10 marbles each. Jar A contains 5 white and 5 red marbles, while jar B contains 3 white and 7 red marbles. A statistician is asked to select one of the jars and then to determine the contents of the jar by drawing two marbles with replacement from the selected jar. The statistician decides to call the jar A unless both selected marbles are red, in which case the jar will be called jar B .

(a) In terms of p , the proportion of red marbles in the jar, what would be the null and alternate hypotheses for the test?

(b) What is α , the size of the Type I error?

(c) What is β , the size of the Type II error?

(d) Suppose, instead of $n = 2$, that $n = 4$ marbles are drawn with replacement. Decide on a decision rule to use, one that has a smaller α and β than those for $n = 2$, if possible. What are α and β for your new rule?