

Name:

Class Number:

Math 54 Exam 4

Fall 2017

Problem 1 _____ Problem 11 _____

Problem 2 _____ Problem 12 _____

Problem 3 _____ Problem 13 _____

Problem 4 _____ Problem 14 _____

Problem 5 _____ Problem 15 _____

Problem 6 _____ Problem 16 _____

Problem 7 _____ Problem 17 _____

Problem 8 _____ Problem 18 _____

Problem 9 _____ Problem 19 _____

Problem 10 _____ Problem 20 _____

Problems 1-5. These problems deal with testing a claim about a mean with the standard deviation unknown. Someone makes a claim that the mean time between activation of a certain sensor is less than 4 seconds. Based on a sample data with $n = 41$ we find \bar{x} equals 4 seconds. The sample standard deviation was found to be $s = 6.5$ and the significance level is 0.05.

Problem 1. What is the null hypothesis?

Problem 2. What is the alternate hypothesis?

Problem 3. What is the critical value? Write your answer using 3 decimal places.

Problem 4. Test the null hypothesis by computing the test statistic t . What is your value for t ? Write your answer using 3 decimal places.

Problem 5. Should we reject or fail to reject the null hypothesis?

Problems 6-10. These problems deal with testing a claim about a proportion. Someone makes a claim that a new product works more than 75 percent of the time. Suppose we test 100 samples of the product and 87 do work. We wish to test the hypothesis that this new product works more than 75 percent of the time using a significance level of 0.05.

Problem 6. What is the null hypothesis?

Problem 7. What is the alternate hypothesis?

Problem 8. What is the critical value?

Problem 9. Test the null hypothesis by computing the test statistic z . What is your value of z ? Write your answer using 3 decimal places.

Problem 10. Should you reject or fail to reject the null hypothesis?

Problems 11-12. These problems deal with inferences about two proportions. Consider the following data from two populations that are independent simple random samples:

$$n_1 = 9,000, \quad x_1 = 375, \quad n_2 = 10,000, \quad x_2 = 350.$$

Problem 11. If we test the claim that $p_1 = p_2$, what is the pooled estimate \bar{p} ? Write your answer using 4 decimal places.

Problem 12. If we test the claim that $p_1 = p_2$, what is the test statistic z ? Write your answer using 4 decimal places.

Problem 13. A hypothesis test is designed with a significance level $\alpha = 0.05$. If H_0 is false what is the probability we reject it?

Problem 14. In a study of the effects of a certain drug, light and heavy users of the drug were tested for memory recall, with the results shown below:

light users: $n = 41$, $\bar{x} = 53.8$, $s = 4.8$

heavy users: $n = 31$, $\bar{x} = 55.9$, $s = 4.1$

You may assume the population data is normally distributed.

Compute the F test statistic one would use to study the claim that heavy marijuana users has a standard deviation different from that of light users. Write your answer using 4 decimal places.

Problems 15-19. These problems deal with testing a claim about a standard deviation from a normal distribution. Someone makes a claim that the standard deviation is less than 1.0. Suppose the sample standard deviation was found to be 0.72 based on 25 data points. The significance level is 0.05.

Problem 15. What is the null hypothesis?

Problem 16. What is the alternate hypothesis?

Problem 17. What is the critical values?

Problem 18. What is the test statistic? Write your answer using 3 decimal places.

Problem 19. Should we reject or fail to reject the null hypothesis?

Problem 20. Can the probability of a Type II error be smaller than the probability of a Type I error? Answer Yes or No.

Extra workspace. If you use this space and want it graded then reference it from the Problem being worked.