

### QUIZ 3 STAT4352

Name (Please Print):

*This part is identical to your exam.* Instructions: Each problem/question is of equal value (2 points). You solve problems with closed books, notes, etc.

1. An average temperature in January is 30F. Temperatures, obtained recently over 31 days in January yielded the sample mean 32 and variance 15. Assume normality of the population (what else should you assume and is the assumption reasonable?). (i) Given  $\alpha = .01$ , determine whether this is a sufficient evidence of warming. (ii) As in (i) only that the temperature changed (warming or cooling). (iii) Calculate p-value and explain how it can be used for the temperature analysis.

2. Consider the same problem as in Problem 1 only with the data based on 16 days.

3. To compare two teams, their results were calculated over a period of 9 days and they produced the following statistics:  $\bar{x}_1 = 57$ ,  $\bar{x}_2 = 61$ ,  $s_1^2 = 23$ ,  $s_2^2 = 24$ . Assume that two populations are normal, independent and have the same variance. Test at  $\alpha = .02$  the null hypothesis that scores of the teams are similar.

4. Assume that data for two normal populations are  $\bar{x}_1 = 65$ ,  $n_1 = 16$ ,  $\bar{x}_2 = 63$ ,  $n_2 = 25$  and it is known from historical data that  $\sigma_1^2 = 14$ ,  $\sigma_2^2 = 22$ . Check that: there is a difference between the two populations using the level of significance .02; the same only test that the population mean of the second population is larger. Check your solution via p-values.

5. 29 observations produced sample standard deviation 9. Using  $\alpha = .05$ , test the historical  $\sigma^2 = 80$  versus the historical standard deviation changed.

6. Data collected from two populations produced  $s_1^2 = 26$ ,  $n_1 = 21$ ,  $s_2^2 = 20$ ,  $n_2 = 18$ . Test the historical opinion that the populations have the same variances versus different ones with the level of significance 0.01.

7. Suppose that on a test you answered 8 questions from 20. You say that you studied hard and, as a result, can answer at least 75% of questions. Does the result support your opinion?

8. Find the critical region of the likelihood ratio test for testing  $H_0 : \mu =$

$\mu_0$  versus  $\mu > \mu_0$  for a sample from a normal population. Assume that the population variance is given.