

Quiz 2 – 1/25/2024

Instructions. You have 15 minutes to complete this quiz. You may use your plebe-issue TI-36X Pro calculator. You may not use any other materials.

Show all your work. To receive full credit, your solutions must be completely correct, sufficiently justified, and easy to follow.

Problem	Weight	Score
1a	1	
1b	1	
2a	0.5	
2b	0.5	
2c	0.5	
2d	0.5	
Total		/ 40

Problem 1. You have been recently hired as an analyst at the Simplexville Auto Emporium. You are interested in the mean price for a used 5-year-old SUVs. You randomly sample 27 such listings on Cars.com. Using a normal Q-Q plot, you find that your price data approximately follows a Normal distribution. You also find that the sample mean price is \$28,141, and the sample standard deviation is \$5,776.

- a. Construct a 95% confidence interval for the mean price for a used 5-year old sedan. Provide your answers to 3 decimal places.

You may find the following critical values helpful: $t_{0.005,26} = 2.77$ $t_{0.025,26} = 2.05$ $t_{0.05,26} = 1.70$

See page 4 of Lesson 3 Part 1 to review the formula for a confidence interval for the population mean when the population variance is unknown. In addition, see Lesson 3 Part 2, as well as Problems 1 and 2 from the Lesson 3 Exercises for examples of how to compute such a confidence interval.

Also, there was a typo in the critical values given in the original quiz; the highlighted subscripts above were originally 27, 19, and 19, respectively, instead of 26. My apologies. To compensate, I was more lenient when grading this problem.

- b. You explain to your new colleague that you are “95% confident” that the interval you found in part a contains the true mean nightly rate. Briefly explain what this means.

See page 3 of Lesson 3 Part 1 for an explanation of what “95% confident” means.

Problem 2. The Simplexville Theater has recently hired you as an analyst. In the past, the theater sold an average of 725 tickets per day. You've been asked to test whether the average daily number of tickets sold has dropped significantly over the past year.

Using the records for the past year, based on 260 operating days, the sample mean of the daily number of tickets sold is 712, and the sample standard deviation is 118.

Perform a t -test for one population mean by answering the following prompts.

- a. Let μ be the mean daily number of tickets sold. State the null and alternative hypotheses.

See Lesson 4 Part 1 for details on stating the hypotheses for the t -test for one population mean. Note that \bar{x} is the sample mean (estimate), and μ_0 is the hypothesized value of the unknown population mean.

See Problem 3 in the Lesson 4 Part 2 Exercises for a similar problem.

- b. Calculate the test statistic. Provide your answer to three decimal places.

See Lesson 4 Part 1 for details on how to compute the test statistic for the t -test for one population mean. Note that the test statistic t can be negative.

- c. Suppose the p -value is 0.038. Using a significance level of 0.05, do you reject or fail to reject the null hypothesis? Briefly explain.

Most of you had the right idea here. See Lesson 4 Part 1 for details on how to use the p -value. See Problem 3 in the Lesson 4 Part 2 Exercises as well.

- d. Based on your answer to part c, state your conclusion about the average daily number of tickets sold.

Be careful with your language here. See Lesson 4 Part 1 for a template of suitable language.

The conclusion of a hypothesis test like the t -test for one population mean is never certain. You can say things like, "we see significant evidence that the average daily number of tickets sold has dropped" or "we have strong evidence that the average daily number of tickets sold has dropped", but avoid definitive language like "we conclude that the average daily number of tickets sold has dropped".