Question 1 (1 point)

Your local Kroger has zero rolls of toilet paper in stock. (And yet there seems to be plenty of fresh produce, baked goods, and canned items; how odd.) So you put on your N95 mask, visit a total of n = 10 grocery stores, and determine a sample mean of 9.426 rolls and standard deviation of 8.697 rolls, with <u>unknown</u> population standard deviation. You wish to test the following hypotheses on the mean number of rolls of toilet paper available at a given store using the p-value approach:

$$H_0: \mu = 0$$

$$H_1: \mu \neq 0$$

Which type of alternative hypothesis is this?

- ☑ Two-sided
- ☐ Upper-one-sided
- ☐ Lower-one-sided
- ☐ Lower-west-sided
- ☐ None of the Above

Question 2 (2 points)

Compute the test statistic and write it in the space provided.

$$t_0 = \frac{9.426 - 0}{8.697/\sqrt{10}} = 3.427$$

Question 3 (1 point)

How many degrees of freedom are in this problem?

- ☐ 10
- ☐ 3
- ☑ 9
- ☐ 0
- ☐ Finishing this degree will mean freedom from Joe Tritschler's obnoxious exams.

Question 4 (3 points)

Determine the p-value. Write your answer and supporting steps in the space provided.

$$t_{0.005,9} = 3.250$$

$$t_{0.0025,9} = 3.690$$

$$0.0025 < p/2 < 0.005$$

$$\underline{0.005 < p < 0.010}$$

Question 5 (1 point)

Based on this p-value, and compared to $\alpha = 0.05$, which would you do?

⊙   Reject $H0$

.

☐   Fail to reject $H0$

☐   Reject to fail $H0$

☐   fail $H0$

☐   Fail to fail $H0$

☐   Fail this exam.

☐   Fail at life in general.

Question 6 (2 points)

Our friends at Yellow Springs Brewery strive to maintain consistently high quality in their canning operation. Cans are evaluated for fill volume by their mass. In a random sample of n = 24 cans, the mean can mass was found to be 369 g with a standard deviation of 0.548 g. Chris Hutson claims the standard deviation never goes above 0.5 g. You have been asked to test the following hypotheses on the population standard deviation of can mass at the fixed $\alpha = 0.05$ level of significance:
H_0: $\sigma = 0.5$ g
H_1: $\sigma > 0.5$ g
First of all, what is the rationale for an upper-one-sided alternative hypothesis in this type of problem? We discussed this in class.

Same rationale as the use of an upper-one-sided confidence bound on variance or standard deviation; we often don't care how *low* it goes, because that's a good thing!

Question 7 (2 points)

Compute the test statistic.

$$\chi_0^2 = \frac{(24-1)0.548^2}{0.5^2} = 27.63$$

Question 8 (2 points)

Write the critical value(s) for this test.

$$\chi_{23,0.05}^2 = 35.17$$

Question 9 (1 point)

Comparing your test statistic to this critical value, what would you do?

☐   Reject H_0 and recommend that Chris Hutson be fired.

☑   Fail to reject H_0

and buy Chris Hutson a beer; for he is indeed a jolly good fellow, which nobody can deny.