MTH 324, Quiz #5, Fall 2022 Name KEY

**Instructions**: Answer each question as thoroughly as possible. Round answers to 4 decimal places as needed. Exact answers are best when possible. Be sure to answer all parts of each question.

1. A certain soft drink bottler claims that less than 20% of its customers drink another brand of soft drink on a regular basis. A random sample of 100 customers yielded 18 who did in fact drink another brand of soft drink on a regular basis. Do these sample results support the bottler's claim? (Use a level of significance of 0.05.) Clearly state your null and alternative hypothesis, check any assumptions, and clearly state your conclusion in the context of the problem.

$H_0: p = 0.2$

$H_a: p < 0.2$

$$z = \frac{.18 - .20}{\sqrt{\frac{.2(.8)}{100}}} = -0.5$$

$p = 0.3538$

fail to reject $H_0$

There is insufficient evidence to conclude that fewer than 20% drink another soda.

R command

prop.test(18, 100, 0.2, alternative = "less")

$np_0 > 10$ ✓

2. Your company wants to improve sales. Past sales data indicate that the average sale was $112 per transaction. After training your sales force, recent sales data (taken from a sample of 25 salespeople) indicates an average sale of $137, with a standard deviation of $12.75. Did the training work? Test your hypothesis at a 5% alpha level. Clearly state your null and alternative hypothesis, check any assumptions, and clearly state your conclusion in the context of the problem.

$H_0: \mu = 112$

$H_a: \mu > 112$

$$t = \frac{137 - 112}{\frac{12.75}{\sqrt{25}}} = 9.8039$$

$p = 3.6 \times 10^{-10}$

reject $H_0$

There is good reason to think the training worked.