

Name: _____ ID: _____ Sec.: _____ Serial: _____

10 a. Q1. A dry cleaning establishment claims that a new spot remover will remove more than 70% of the spots which is applied. To check this claim, the spot remover used on 200 spots chosen at random and found that in 150 spots were removed. Test the claim using the p-value and based on $\alpha = 0.05$.

1. $H_0: p = 0.7$ vs $H_1: p > 0.70$ } 2 pts

2. $Z_c = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$, $\hat{p} = \frac{x}{n} = \frac{150}{200} = 0.75$ } 1 pt

$Z_c = \frac{0.75 - 0.70}{\sqrt{\frac{(0.7)(0.3)}{200}}} = 1.54$ } 2 pts

3. $P\text{-value} = P(Z > Z_c) = P(Z > 1.54)$
 $= 1 - P(Z < 1.54)$
 Reject H_0 if $P\text{-value} < \alpha$ } 3 pts

4. $P\text{-value} < \alpha \Rightarrow \therefore$ Do not reject H_0

5. The claim that the new spot remover will remove more than 70% is NOT correct. } 2 pts

10 Q2. A large automobile manufacturing company is trying to decide whether to purchase brand A or brand B tires of its new models. To help arrive at a decision, an experiment is conducted using 12 of each brand. The tires are run until they wear out. The results (In thousands) are: **Brand A:** $\bar{x}_1 = 37.9$, $s_1 = 5.1$ and for **Brand B:** $\bar{x}_2 = 39.8$, $s_2 = 5.9$. Test the hypothesis that there is no difference in the two brands of tires. Assume the populations to be approximately normally distributed with equal variances. Use $\alpha = 0.01$

$n_1 = 12, \bar{x}_1 = 37.9, s_1 = 5.1$ $n_2 = 12, \bar{x}_2 = 39.8, s_2 = 5.9$

1. $H_0: \mu_1 - \mu_2 = 0$ vs $H_1: \mu_1 - \mu_2 \neq 0$ } 2 pts

2. $t_c = \frac{\bar{x}_1 - \bar{x}_2 - d_0}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$, $s_p^2 = \frac{(12-1)(5.1)^2 + (12-1)(5.9)^2}{12+12-2} = 30.41$ } 3 pts
 $s_p = \sqrt{30.41} = 5.5145$

$\therefore t_c = \frac{(37.9 - 39.8) - 0}{5.5145 \sqrt{\frac{1}{12} + \frac{1}{12}}} = -0.8440$ } 2 pts

3. $t_{\alpha/2, n_1+n_2-2} = t_{0.005, 22} = 2.819$ } 1 pt

Reject H_0 if $|t_c| > t_{\alpha/2, n_1+n_2-2}$

$|-0.8440| < 2.819 \Rightarrow$ Do not reject H_0 } 2 pts

4. Based on the data NO difference exists.