

*** SOLUTIONS ***

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-212-Term051-I-Quiz #2

Name: _____

ID: _____

Serial: _____

Question One (6-Points)

The designer of a new sheet-metal stamping machine claims that his new machine can turn out certain product faster than the machine now in use. Nine independent trials of stamping the product on each machine gave the following results on times to completion:

Old Machine:	$n_1 = 9$	$\bar{x} = 35.22$ seconds	$s = 4.94$ seconds
New Machine:	$n_2 = 9$	$\bar{x} = 31.56$ seconds	$s = 4.48$ seconds

Assume that time to completion is normally distributed. Test using $\alpha = 0.05$ the hypothesis that the new machine is faster than the old.

1. The hypothesis are:

$$\begin{aligned} H_0: & \mu_1 - \mu_2 \geq 0 \\ H_A: & \mu_1 - \mu_2 < 0 \end{aligned} \quad \textcircled{1}$$

2. The test statistic value:

$$s_p = \sqrt{\frac{(9-1)(4.94)^2 + (9-1)(4.48)^2}{9+9-2}} = \sqrt{22.237} = 4.7156 \quad \textcircled{1}$$

$$t_c = \frac{35.22 - 31.56 - 0}{4.7156 \sqrt{\frac{1}{9} + \frac{1}{9}}} = 1.6465 \quad \textcircled{1}$$

$$t_{\alpha, n_1+n_2-2} = t_{0.05, 16} = 1.7459 \quad \textcircled{1}$$

$$\begin{aligned} \text{Reject } H_0 \text{ if } t_c < -t_{\alpha} \\ 1.6465 & \not< -1.7459 \end{aligned}$$

3. Decision Rule: Do not reject H_0 . $\textcircled{1}$

4. conclusion: The old machine faster than the new one. $\textcircled{1}$

The claim is not correct. $\textcircled{1}$