SOLUTIONS
King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics-STAT-319-Term071-Quiz7

Name: ID: Serial:

Q1. A contract with a parts supplier calls for no more than .05 defects in the large shipment of parts. To test whether the shipment meets the contract, the receiving company has selected a random sample of n = 100 parts and found 6 defects.

    a. Test hypothesis using a significance level equal to 0.05.

I. $H_0 : P = 0.05 \quad VS \quad H_1 : P > 0.05$

II. $\hat{p} = \dfrac{x}{n} = 0.06 \Rightarrow Z_C = \dfrac{0.06 - 0.05}{\sqrt{\dfrac{(0.05)(0.95)}{100}}} = 0.4588 \simeq 0.46$

    $Z_\alpha = Z_{0.05} = 1.645 \Rightarrow$ Reject H_0 if $Z_C > Z_\alpha$

III. $0.46 \not> 1.645$ **(4-Points)**

    $\therefore$ Don't reject H_0

    b. Find the p-value.

$P-value = P(Z > Z_C) = P(Z > 0.46) = 1 - 0.6772 = 0.3228$ **(1-Point)**

    c. Which type of errors may be occurred?

Since H_0 was NOT rejected, then Type II error may be occurred   **(1-Point)**

Q2. The makers of a new chemical fertilizer claim that hay yields will average 0.4 tons more per acre if its fertilizer is used than if the leading brand is used. The agricultural testing service was retained to test this claim. A random sample of 14 acre-sized pots was selected, and the new fertilizer was applied. A second sample of 12 acre-sized plots was selected, but leading fertilizer was used. The following sample data (in tons per cares) were observed. Use a significance level equal to 0.05.

<table>
<tr><td>Current Leading brand</td><td>New Product</td></tr>
<tr><td>$n_1 = 14$</td><td>$n_2 = 12$</td></tr>
<tr><td>$\overline{X}_1 = 4.3 tons / acre$</td><td>$\overline{X}_2 = 5.2 tons / acre$</td></tr>
<tr><td>$S_1 = 0.8 tons$</td><td>$S_2 = 0.7 tons$</td></tr>
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  1. $H_0 : \mu_2 - \mu_1 = 0.4 \quad VS \quad H_1 : \mu_2 - \mu_1 > 0.4$ **(1-Point)**

$t_C = \dfrac{(\overline{X}_2 - \overline{X}_1) - d_0}{S_P \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}, \quad S_P = \sqrt{\dfrac{(14-1)(0.8)^2 + (12-1)(0.7)^2}{14 + 12 - 2}} = 0.7558$

  2.   **(1-Point)**

$\Rightarrow t_C = \dfrac{(5.2 - 4.3) - 0.4}{(0.7558)\sqrt{\dfrac{1}{14} + \dfrac{1}{12}}} = 1.6816$

    $t_{\alpha, n_1 + n_2 - 2} = t_{0.05, 24} = 1.7109$

  3.   Reject H_o if $t_C > 1.7109$ **(1-Point)**

    $\Rightarrow 1.6816 \not> 1.7109$

    $\therefore$ Do NOT reject H_o

  4. The claim is NOT correct   **(1-Point)**