KFUPM
Mathematical Sciences

Term 042
STAT 212
Quiz# 2

Date: 12/3/2005
Duration: 15 minutes

Name: ID#: Section#: 1 2 3 Serial#:

Show your work in detail and write neatly and eligibly

The following data represent the remedy duration for two groups each of size 20 patients admitted to a hospital subjected to a certain drug

G1	2	5	6	2	3	8	7	9	5	4	1	4	6	8	2	4	6	7	8	7
G2	3	6	7	4	4	9	8	10	6	5	3	5	7	9	4	5	7	8	9	8

Given that $\bar{x}_1 = 5.2$, $s_1 = 2.38$, $\bar{x}_2 = 6.35$, $s_2 = 2.16$, $\bar{d} = -1.15$ and $s_d = 0.366$, do the data present significant increase in the mean remedy time for the second group? Use the P-value approach at 2% significance level.

$H_0: \mu_2 \le \mu_1$ $\left(H_0: \mu_2 - \mu_1 \le 0\right)$ ~~$\left(H_0: \mu_1 - \mu_2 \ge 0\right)$~~ $\alpha = 0.02$

$H_A: \mu_2 > \mu_1$ $\left(H_A: \mu_2 - \mu_1 > 0\right)$ ~~$\left(H_A: \mu_1 - \mu_2 < 0\right)$~~ $n_1 + n_2 - 2 = 38$

Assumptions:

1. Indep. Samp.
2. Small Samp.
3. Normal Pop.
4. Unknown St.
5. Assumed Equal

$$S_p = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}} = \sqrt{\frac{S_1^2+S_2^2}{2}}$$

$$= \sqrt{5.165} = 2.27$$

$$T_0 = \frac{(\bar{x}_2 - \bar{x}_1) - 0}{S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} = \frac{6.35 - 5.2}{2.27\sqrt{\frac{1}{20}+\frac{1}{20}}}$$

$$= \frac{1.15}{0.72} = 1.6$$

p-value $= P(t > T_0)$

$= P(t > 1.6)$

$0.05 < \text{p-value} < 0.1$

In all cases

Since p-value $\not< 0.02 = \alpha$

$\Rightarrow$ Do NOT reject H_0.

Conclusion:

The data provide sufficient evidence to conclude that THERE IS NO SIG. INCREASE IN THE SECOND GROUP at 2% sig. level.

With My Best Wishes

KFUPM | Term 042 | Date: 12/3/2005

Mathematical Sciences | STAT 212 | Duration: 15 minutes

Quiz# 2

Name: ID#: Section#: 1 2 3 Serial#:

Show your work in detail and write neatly and eligibly

The following data represent the remedy duration for 20 patients admitted to a hospital subjected to two different drugs

D1	2	5	6	2	3	8	7	9	5	4	1	4	6	8	2	4	6	7	8	7
D2	3	6	7	4	4	9	8	10	6	5	3	5	7	9	4	5	7	8	9	8

Given that $\bar{x}_1 = 5.2$, $s_1 = 2.38$, $\bar{x}_2 = 6.35$, $s_2 = 2.16$, $\bar{d} = -1.15$ and $s_d = 0.366$, Do the data present significant difference in the mean remedy time between the two drugs? Use the critical value approach at 2% significance level.

$H_0: \mu_2 \leq \mu_1$ ($H_0: \mu_2 - \mu_1 \leq 0$) ($H_0: \mu_1 - \mu_2 \geq 0$) $\alpha = 0.02$

$H_A: \mu_2 > \mu_1$ ($H_A: \mu_2 - \mu_1 > 0$) ($H_A: \mu_1 - \mu_2 < 0$)

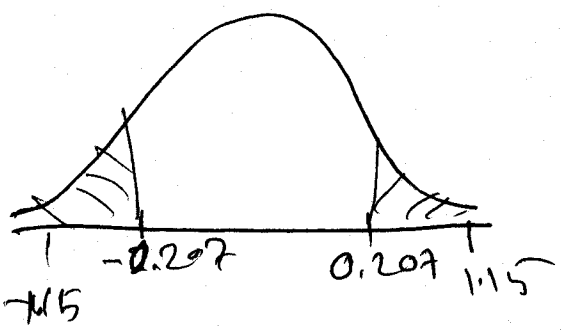
$H_0: \mu_D = 0$ $\quad \bar{d} = +1.15$ $\quad t_{\frac{\alpha}{2}; n-1} = t_{0.01; 19} = 2.528$

$H_A: \mu_D \neq 0$ $\quad S_d = 0.366$

$$\bar{d}_{\frac{\alpha}{2}} = \mu_D \pm t_{\frac{\alpha}{2}} \frac{S_d}{\sqrt{n}}$$

$$= 0 \pm (2.528) \frac{0.366}{\sqrt{20}}$$

$$= 0 \pm 0.207$$



Compare $\bar{d}_{\frac{\alpha}{2}}$ with $\bar{d}$

Since $\bar{d} = 1.15 \notin [-0.207, 0.207]$

$\Rightarrow$ Reject H_0

Conclusion:

The data provide sufficient evidence to conclude that there is a SIGNIFICANT DIFFERENCE IN THE MEAN TIME REMEDY FOR THE TWO DRUGS.

With My Best Wishes