# Math 663-101, Fall 2010

**Quiz # 5**

**Name:____________**
**Student ID:____________**

*November, 22*
Must show all work for full credit!
I pledge I have not violated the NJIT Honor Code______________________

A clinical trial is performed comparing a test (newly developed) drug to an active control (a drug already proven effective) and to a placebo. Persons with diagnosed hypertension who are at least 18 years of age are eligible for the trial. Persons agreeing to participate are randomly to one of the competing drugs. The outcome measure is systolic blood pressure (SBP), which is measured 4 weeks post randomization. Summary statistics are

| Drug | n | Mean (SD) SBP |
|---|---|---|
| Test | 15 | 125 (25) |
| Control | 15 | 135 (21) |
| Placebo | 15 | 160 (22) |

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between | 9750 | 2 | 4875 | 9.43 |
| Within | 21,700 | 42 | 516.7 | |
| Total | 31,450 | 44 | | |

The one way ANOVA shows that the three means for the drugs are significantly different (reject $H_0$: $\mu_1 = \mu_2 = \mu_3$) at 5% significance level.

If we are interested in running the following pairwise comparisons and contrast, run the appropriate tests for the following.

1. Is there a significant difference in mean SBPs 4 weeks post randomization between the test drug and placebo at 5% significance level? (5 points)
2. Is there a significant difference in mean SBPs 4 weeks post randomization between the test drug and control drug at 5% significance level? (5 points)

**1.** $H_0$: $\mu_1 = \mu_3$

$H_1$: $\mu_1 \neq \mu_3$ $\alpha = 0.05$

Reject $H_0$ if $F \geq (k\text{-}1)\, F_{0.05}(2,42) = 2(3.22) = 6.44$

$$F = \frac{(\bar{X}_1 - \bar{X}_3)^2}{MSE(\frac{1}{n_1}+\frac{1}{n_3})} = \frac{(125-160)^2}{516.7(\frac{1}{15}+\frac{1}{15})} = 1225/68.9 = 17.8$$

Reject $H_0$ since $17.8 > 6.44$. We have significant evidence, $\alpha = 0.05$, to show that $\mu_1 \neq \mu_3$.

**2.** $H_0$: $\mu_1 = \mu_2$

$H_1$: $\mu_1 \neq \mu_2$ $\alpha = 0.05$

Reject $H_0$ if $F \geq (k\text{-}1)\, F_{0.05}(2,42) = 2(3.22) = 6.44$

$$F = \frac{(\bar{X}_1 - \bar{X}_2)^2}{MSE(\frac{1}{n_1}+\frac{1}{n_2})} = \frac{(125-135)^2}{516.7(\frac{1}{15}+\frac{1}{15})}$$ $= 100/68.9 = 1.45$. Do not reject $H_0$ since $1.45<6.44$.

We do not have significant evidence, $\alpha = 0.05$, to show that $\mu_1 \neq \mu_2$.