IX. Three computer component assembly methods were compared by Insel Corporation. Employee efficiency was based upon production time and product quality.

A. Use ANOVA analysis to test at the .05 level of significance whether mean employee efficiency of these assembly methods are equal.

ANOVA Analysis of Assembly Methods							
	Employee Efficiency Ratings for 3 Treatments (T)						Row Totals Required for Calculations
	Method 1		Method 2		Method 3		
	Score X_1	X_1^2	Score X_2	X_2^2	Score X_3	X_3^2	
	4	16	6	36	8	64	
	6	36	7	49	8	64	
	7	49	4	16	9	81	
	7	49	7	49	9	81	
$\sum x_T$	24		24		34		$\sum x = 82$
$(\sum x_T)^2$	576		576		1156		
n	4		4		4		N = 12
$\frac{(\sum x_T)^2}{n}$	144		144		289		$\sum[\frac{(\sum x_T)^2}{n}] = 577$
$\sum x_T^2$		150		150		290	$\sum x^2 = 590$

1. $H_0: \mu_1 = \mu_2 = \mu_3 \quad H_1: \mu_1 \neq \mu_2 \neq \mu_3$
2. F is the test statistic and $\alpha = .05$.
3. If F from the test statistic is beyond the critical value of F, the null hypothesis will be rejected.
4. df = t - 1 = 3 - 1 = 2
   df = N - t = 12 - 3 = 9
   f for .05 level of significance is 4.26.
5. Apply the decision rule.

$$F = \frac{MS_T}{MS_E} = \frac{8.335}{1.44} = 5.79$$

Reject H_o because 5.79 > 4.26.
Training methods had different means.

$$SS_T = \sum[\frac{(\sum x_T)^2}{n}] - \frac{(\sum X)^2}{N}$$
$$= 577 - \frac{82^2}{12}$$
$$= 16.67$$
$$MS_T = \frac{SS_T}{t-1} = \frac{16.67}{3-1} = 8.335$$

$$SS_E = \sum x^2 - \sum[\frac{(\sum x_T)^2}{n}]$$
$$= 590 - 577$$
$$= 13.00$$
$$MS_E = \frac{SS_E}{N-t} = \frac{13}{12-3} = 1.44$$

$$SS_{TOTAL} = \sum x^2 - \frac{(\sum x)^2}{N} = 590 - 560.33 = 29.67$$

B. Determine at the .01 level of significance whether there is a difference in performance of those who received teaching methods (treatments) 1 and 3.

$$\bar{X}_1 = \frac{\sum x}{n_1} = \frac{24}{4} = 6.0$$
$$\bar{X}_3 = \frac{\sum x}{n_3} = \frac{34}{4} = 8.5$$

The t for $\alpha/2$ and N - t degrees of freedom (12 - 3 = 9) is 3.25.

$$(\bar{X}_1 - \bar{X}_3) \pm t\sqrt{MS_E(\frac{1}{n_1} + \frac{1}{n_2})}$$
$$(8.5 - 6.0) \pm 3.25\sqrt{1.44(\frac{1}{4} + \frac{1}{4})}$$
$$2.5 \pm 2.758$$
$$-.258 \leftrightarrow 5.258$$

This range indicates the difference between these means could be zero.