C. Complete the following chart using data accumulated to this point.

Variance Analysis Summary Table				
Variance Sources	df	Sum of the Squares	Mean Squares	ANOVA
Between Treatments	t - 1 = 3 - 1 = 2	$SS_T = .057$	$MS_T = \frac{SS_T}{t-1} = \frac{.057}{2} = .0285$	$F = \frac{MS_T}{MS_E} = \frac{.0285}{.00035} = 81$
Block	b - 1 = 3 - 1 = 2	$SS_B = .0071$	$MS_B = \frac{SS_B}{b-1} = \frac{.0071}{2} = .0036$	$F = \frac{MS_B}{MS_E} = \frac{.0036}{.00035} = 10$
Within Treatments (error)	(t - 1)(b - 1) = 2 x 2 = 4	$SS_E = .0014$	$MS_E = \frac{SS_E}{(t-1)(b-1)} = \frac{.0014}{4} = .00035$	
Total Variance	N - 1 = 9 - 1 = 8	$SS_{TOTAL} = .0655$		

D. Using the 5-step approach to hypothesis testing, determine at the .01 level of significance whether the sample treatment and block means come from populations with equal means.

1. A check of each null hypothesis will be made.
   a. $H_0 : \mu_1 = \mu_2 = \mu_3$ and $H_1 : \mu_1 \neq \mu_2 \neq \mu_3$ for the treatment means

   b. $H_0 : \mu_1 = \mu_2 = \mu_3$ and $H_1 : \mu_1 \neq \mu_2 \neq \mu_3$ for the block means

2. The level of significance is .01.
3. The test statistic is F.
4. The decision rule will be, if F from the test statistic is beyond the critical value of F for the .01 level of significance, the null hypothesis will be rejected.
5. Apply the decision rule.

Degrees of freedom for the treatment hypothesis is 2 for the numerator and 4 for the denominator.

F is 18.

$F = \frac{MS_T}{MS_E} = 81$ Reject H_0 because 81 > 18.

Parts from these 3 departments do not have equal means.

Degrees of freedom for the block hypothesis is 2 for the numerator and 4 for the denominator.

F is 18.

$F = \frac{MS_T}{MS_E} = 10$ Accept H_0 because 10 < 18.

Parts produced at different times have equal means.

Note: With so much of the total variability explained by the treatment, there was little left to be explained by the block.

II. Using information from page 111, determine at the .01 level of significance whether there is a difference between treatments 1 and 3.

$$\bar{X}_1 = \frac{\sum x}{n_1} = \frac{26.75}{3} = 8.92$$

$$\bar{X}_3 = \frac{\sum x}{n_3} = \frac{27.30}{3} = 9.10$$

The t for .005 and df of 6 is 3.707.
MS_E from page PS 111 is .0014.

$$(\bar{x}_3 - \bar{x}_1) \pm t\sqrt{MS_E\left(\tfrac{1}{n_1} + \tfrac{1}{n_2}\right)}$$

$$(9.10 - 8.92) \pm 3.707\sqrt{.0014\left(\tfrac{1}{3} + \tfrac{1}{3}\right)}$$

$$.18 \pm .113$$

The range of .067 ↔ .293 indicates the means are different.