MA 542: REGRESSION ANALYSIS

QUIZ - 3 n **Name** Key

The director of admissions of a small college selected 120 students at random from the new freshman class in a study to determine whether a student's grade point average (GPA) at the end of the freshman year (Y) can be predicted from the ACT test score (X). The following is an incomplete ANOVA table for the simple linear regression model.

Response: Y

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
ACT (X)	---	---	---	9.2402	0.002917
Residuals	---	45.818	---		
Total	---	49.406			

a) Find regression sum of squares, degrees of freedom for regression sum of squares, error sum of squares and total sum of squares and mean squares for the regression and the error.

$SSR = SSTO - SSE = 3.588$

$df_{SSTO} = n-1 = 119$

$df_{SSE} = n-2 = 118$

$df_{SSR} = 1$

$MSR = \frac{SSR}{1} = 3.588$

$MSE = \frac{SSE}{n-2} = 0.3883$

b) Perform a hypotheses test to test whether association between ACT test score and the GPA at the end of the freshman year is significant or not. (State the hypotheses, value of the test statistic, p-value and conclusion)

i) $H_0: \beta_1 = 0$ vs $H_1: \beta_1 \neq 0$

ii) Test statistic

$f^* = 9.2402$ ← from the table

iii) p-value

p-value $= 0.002917$ ← from the table

iv) Since p-value $< 0.05 (= \alpha)$, H_0 is rejected.

So there is a significant linear association between ACT test score and GPA.