d

Source	df	SS	MS	F
Regression:				
Degree 1 (X)	1	12.7054	12.7054	255.13
Degree 2 ($X^2 \mid X$)	1	3.9051	3.9051	78.42
Residual:				
Lack of fit	3	0.5145	0.1713	8.85
Pure Error	12	0.2325	0.0194	
Total	17	17.3575		

Explanation: SSY = Regression SS + Residual SS = 16.610475 + 0.746939 (values taken from the 'Total Regress' and 'Total Error' rows of the 'Type I Sum of Squares' column on the SAS output)
= 17.3574. The remaining SS values are taken directly from the SAS output. The MS values are SS/df, and the F statistics are taken directly from the SAS output (or they could be calculated as the ratio of the relevant MS values -- see parts (c), (f) and (g) for more details).

e $r^2_{XY} = 0.732;\ r^2(\text{quadratic}) = 0.957$

f Test for significance of straight line regression of Y on X

H_0: The straight line regression is not significant.

$$F = \frac{\text{Regression MS}(X)}{\text{Residual MS}(X)} = \frac{12.7054}{(4.4196 + 0.2325)/16} = \frac{12.7054}{0.2908} = 43.69$$

(1, 16 df)
From the F tables in the text: $P < 0.001$
At $\alpha = 0.05$ we reject H_0 and conclude that the straight line regression is significant.

Test for adequacy of straight line model

H_0: The straight line model is adequate.

$$F = \frac{\text{MS l.o.f.}(X)}{\text{MS P.E.}(X)} = \frac{1.1049}{0.0194} = 56.95$$

(4, 12 df)
$P < 0.001$
At $\alpha = 0.05$ we reject H_0 and conclude that the straight line model is not adequate.