Practice Problem

Problem 11.10:

A study was conducted to determine whether a student's final grade in STA4106 is linearly related to his or her performance on the MATH ability test before entering college.

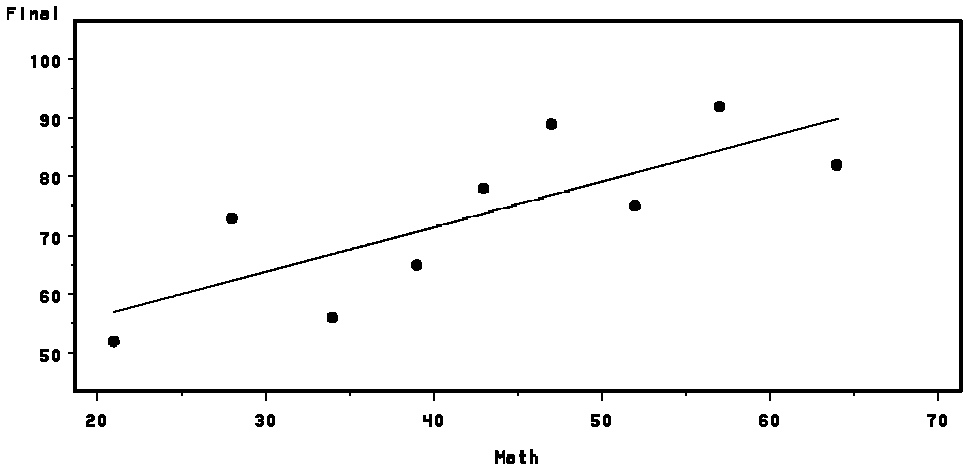
OBS	MATH	FINAL
1	39	65
2	43	78
3	21	52
4	64	82
5	57	92
6	47	89
7	28	73
8	75	98
9	34	56
10	52	75

Given that $SS_{xx} = 2474,\ SS_{xy} = 1894,\ SS_{yy} = 2056,\ \bar{x} = 46,$ and $\bar{y} = 76$

(a) Fit a least squares line to relate the math score and the final grade.

(b) Based on Figure 11.18, do you think the straight-line model fits the data well?

Figure 11.18 Scattergram for Problem 11.10



(c) Calculate SSE, s^2, and s.

(d) Do the data provide sufficient evidence to indicate that a positive relationship exists between math score and final grade at $\alpha = 0.05$?

(e) Find the observed significance level for the test in part (d) using the following SAS printout.

```
Model: MODEL1
Dependent Variable: FINAL

Analysis of Variance

                          Sum of          Mean
Source          DF       Squares        Square     F Value    Prob>F

Model            1    1449.97413    1449.97413      19.141    0.0024
Error            8
C Total          9

    Root MSE                   R-square
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Dep Mean	76.00000	Adj R-sq	0.6684
C.V.	11.45215		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1		8.50686138	4.794	0.0014
MATH	1				0.0024

(f) Calculate the coefficient of determination and the sample correlation coefficient.

(g) Find a 95% confidence interval for the mean final grade for students scoring 35 on the math exam.

(h) Find a 90% prediction interval when math score is 50.

(i) Find a 95% confidence interval for the slope β_1.