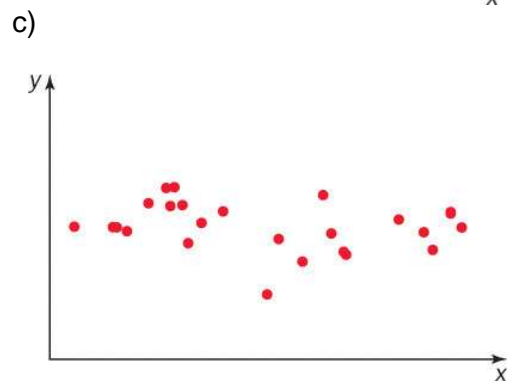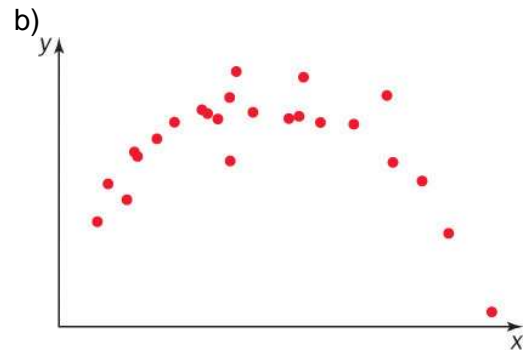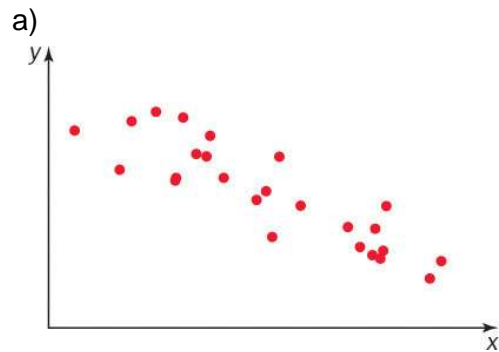**(4 pts.) 1**. For each of the following graphs, identify the form, direction and strength. In addition, state if you thing that there is an association between X and Y.

a)

b)

c)

d)
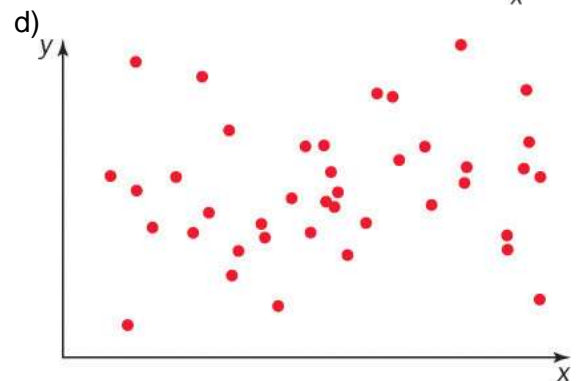
(11 pts.) 2. Sailboat enthusiasts believe that the wind speed (x, in miles per hour) is linearly related to (downwind) boat speed (y, in knots). For wind speeds between 10 and 30 mph and Hobie catamarans, the following summary data was obtained.

n = 10, S_{XX} = 253.01, S_{YY} = 154.61, S_{XY}= 116.70, $\bar{x}$ = 20.51, $\bar{y}$ = 12.95.

The scatter plot of the data is shown below:
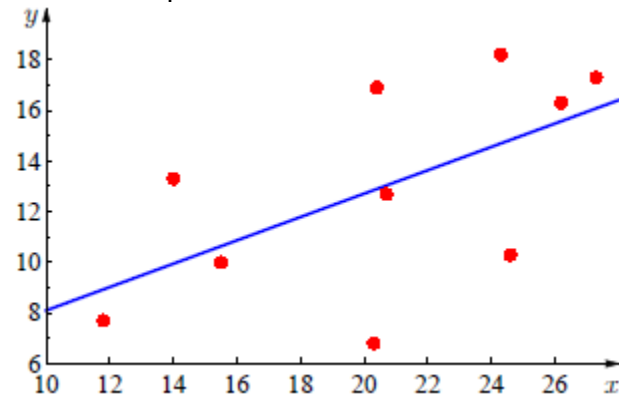
(2 pts.) a) Find the estimated regression line.

(6 pts.) b) Complete the following ANOVA table.

Source of variation	Sum of squares	Degrees of Freedom	Mean square
Regression			
Error			
Total			

(1 pt.) c) What is the estimated variance?

(1 pt.) d) What is the proportion of the variance in boat speed that is explained by the wind speed?

(1 pt.) e) Do you believe that there is an association between wind speed and boat speed? Please explain your answer.

(2 pts.) 3. Some physicians use the cholesterol ratio (CR = total cholesterol/HDL cholesterol) as a measure of a patient's risk of heart disease. In addition, the triglyceride concentration (TG) is associated with coronary artery disease in many patients. In a study of the relationship between these two variables, a random sample of adults was obtained, and the triglyceride level (x_1; mg/dL) and cholesterol ratio (y) was obtained for each person. The scatterplot and regression line of ln (triglyceride level - 129) x_2 vs. cholesterol ratio is below.
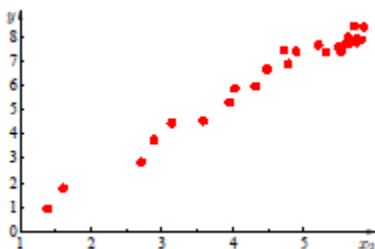
$$\hat{y} = -0.8059 + 1.5603x_2$$

The ANOVA summary table is

Source of Variation	Sum of Squares	Degrees of freedom	Mean Square
Regression	103.16	1	103.16
Error	3.20	23	0.14
Total	106.36	24	

(1 pt.) a) What is the coefficient of determination?

(1 pt.) b) Do you think that the triglyceride level causes the cholesterol level? Please explain your answer.

(1 pt.) BONUS: Why do you think that they had to take the logarithm of the triglyceride level?