

A sample of 8 students was collected and each was asked how many hours they spent studying for a particular exam. The responses are listed in the first two columns in the table below and are plotted on the reverse of this sheet.

**Note:** Show all work and carry all calculations to 4 decimal digits.

**ASSIGNMENTS**

- 1) Which is the dependent (response) variable? \_\_\_\_\_
- 2) Which is the independent (explanatory) variable? \_\_\_\_\_
- 3) Compute the mean and standard deviation of each variable. Show your work and use the first 4 empty columns below.

x	y								
Hours	Score	$(x - \bar{x})$	$(x - \bar{x})^2$	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$	$\hat{y}$	$(y - \hat{y})$	$(y - \hat{y})^2$
20	64	-4	16	-12	144	48	70.0136	-6.0136	36.1635
16	61	-8	64	-15	225	120	64.0272	-3.0272	9.1640
34	84	10	100	8	64	80	90.9660	-6.9660	48.5250
23	70	-1	1	-6	36	6	74.5034	-4.5034	20.2806
27	88	3	9	12	144	36	80.4898	7.5102	56.4032
32	92								
18	72								
22	77								
<b>192</b>	<b>608</b>								

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- 4) Calculate the slope and y-intercept for the least squares regression line.
- 5) Based on your answers to the previous problem, the sample regression equation is  $\hat{y} = \text{_____} + \text{_____} x$
- 6) Use your sample regression equation to compute the estimated values and record them in the  $\hat{y}$  column above.
- 7) Compute the errors  $(y - \hat{y})$  and record them in the table above. What is the sum of these errors?
- 8) Compute the squared errors  $(y - \hat{y})^2$  and record them in the table above. What is the sum of these squared errors?
- 9) Calculate SST, SSR, and SSE.
- 10) Calculate and interpret the sample coefficient of determination,  $r^2$ .
- 11) Calculate and interpret the sample correlation coefficient,  $r$ .
- 12) Calculate the standard error of the estimate.
- 13) Perform a 6-step hypothesis test of the significance of the *slope*. Test at the 5% level of significance.
- 14) What is the estimated mean exam score for students who study 30 hours?
- 15) Compute a 95% *confidence* interval for the *mean* score of *all* students who studied 30 hours.
- 16) Compute a 95% *prediction* interval for the score of an *individual* student who studied 30 hours.

