1. Award: **1.00 point**

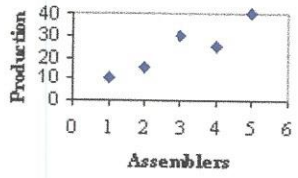
The production department of Celltronics International wants to explore the relationship between the number of employees who assemble a subassembly and the number produced. As an experiment, 3 employees were assigned to assemble the subassemblies. They produced 14 during a one-hour period. Then 5 employees assembled them. They produced 23 during a one-hour period. The complete set of paired observations follows.

Number of Assemblers	One-Hour Production (units)
3	14
5	23
2	9
6	39
4	30

The dependent variable is production; that is, it is assumed that different levels of production result from a different number of employees.

Click here for the Excel Data File

b. A scatter diagram is provided below. Based on it, does there appear to be any relationship between the number of assemblers and production?



Yes ▼ , as the number of assemblers increases ▼ , so does the production.

c. Compute the correlation coefficient. **(Negative amounts should be indicated by a minus sign. Round s_x, s_y and r to 3 decimal places.)**

X	Y	$X-\overline{X}$	$Y-\overline{Y}$	$(X-\overline{X})^2$	$(Y-\overline{Y})^2$	$(X-\overline{X})(Y-\overline{Y})$
3	14		-9		81	
5	23	1		1		0
2	9		-14		196	
6	39	2		4		32
4	30		7	0		0

$\overline{X}$ = $\overline{Y}$ = s_x =

s_y = r =

References

Worksheet Difficulty: 2 Intermediate Learning Objective: 13-02 Calculate a correlation coefficient to test and interpret the relationship between two variables.

2. Award: **1.00 point**

The following sample observations were randomly selected. **(Round your answers to 2 decimal places.)**

X:	4	5	3	6	10
Y:	9.8	9.6	7	16.4	19.6

a. The regression equation is $\hat{Y}$ = _____ + _____ X

b. When X is 5.5 this gives $\hat{Y}$ = _____

References

Worksheet Difficulty: 2 Intermediate Learning Objective: 13-03 Apply regression analysis to estimate the linear relationship between two variables.

3. Award: **10.00 points**

Bi-lo Appliance Super-Store has outlets in several large metropolitan areas in New England. The general sales manager aired a commercial for a digital camera on selected local TV stations prior to a sale starting on Saturday and ending Sunday. She obtained the information for Saturday–Sunday digital camera sales at the various outlets and paired it with the number of times the advertisement was shown on the local TV stations. The purpose is to find whether there is any relationship between the number of times the advertisement was aired and digital camera sales. The pairings are:

Location of TV Station	Number of Airings	Saturday–Sunday Sales ($ thousands)
Providence	4	15
Springfield	2	8
New Haven	5	21
Boston	6	24
Hartford	3	17

Click here for the Excel Data File

a. What is the dependent variable?

Sales ▼ is the dependent variable.

c. Determine the correlation coefficient. **(Round your answer to 2 decimal places.)**

Coefficient of correlation _____

d. Interpret these statistical measures.

The statistical measures obtained here indicate a strong positive ▼ correlation between the variables.

References

Worksheet Difficulty: 2 Intermediate Learning Objective: 13-02 Calculate a correlation coefficient to test and interpret the relationship between two variables.

4. Award: 10.00 points

The owner of Maumee Ford-Mercury-Volvo wants to study the relationship between the age of a car and its selling price. Listed below is a random sample of 12 used cars sold at the dealership during the last year.

Car	Age (years)	Selling Price ($000)	Car	Age (years)	Selling Price ($000)
1	9	8.1	7	8	7.6
2	7	6.0	8	11	8.0
3	11	3.6	9	10	8.0
4	12	4.0	10	12	6.0
5	8	5.0	11	6	8.6
6	7	10.0	12	6	8.0

Click here for the Excel Data File

a. If we want to estimate selling price on the basis of the age of the car, which variable is the dependent variable and which is the independent variable?

Age ▼ is the independent variable and selling price ▼ is the dependent variable.

b-1. Determine the correlation coefficient. **(Negative amounts should be indicated by a minus sign. Round your answers to 3 decimal places.)**

X	Y	$X-\overline{X}$	$Y-\overline{Y}$	$(X-\overline{X})^2$	$(Y-\overline{Y})^2$	$(X-\overline{X})(Y-\overline{Y})$
9.0	8.1		1.192	0.007	1.420	0.099
7.0	6.0		-0.908	3.674	0.825	1.741
11.0	3.6	2.083		4.340	10.945	-6.892
12.0	4.0	3.083		9.507	8.458	-8.967
8.0	5.0	-0.917	-1.908		3.642	1.749
7.0	10.0	-1.917	3.092		9.558	-5.926
8.0	7.6	-0.917	0.692	0.840		-0.634
11.0	8.0	2.083	1.092	4.340		2.274
10.0	8.0	1.083	1.092	1.174	1.192	
12.0	6.0	3.083	-0.908	9.507	0.825	
6.0	8.6	-2.917	1.692	8.507	2.862	-4.934
6.0	8.0	-2.917	1.092	8.507	1.192	-3.184
107.000	82.900					

$\overline{X}$ = $\overline{Y}$ = s_x = s_y =

r =

b-2. Determine the coefficient of determination. **(Round your answer to 3 decimal places.)**

c. Interpret the correlation coefficient. Does it surprise you that the correlation coefficient is negative? **(Round your answer to nearest whole number.)**

Moderate ▼ correlation between age of car and selling price. So, % of the variation in the selling price is explained by the variation in the age of the car.

References

Worksheet Difficulty: 2 Intermediate Learning Objective: 13-02 Calculate a correlation coefficient to test and interpret the relationship between two variables.

5. Award: **10.00 points**

Pennsylvania Refining Company is studying the relationship between the pump price of gasoline and the number of gallons sold. For a sample of 20 stations last Tuesday, the correlation was .78.

At the .01 significance level, is the correlation in the population greater than zero? **(Round your answer to 3 decimal places.)**

The test statistic is _____.

Decision: Reject ▼ H_0: $\rho \leq 0$

References

Worksheet Difficulty: 2 Intermediate Learning Objective: 13-02 Calculate a correlation coefficient to test and interpret the relationship between two variables.