**Homework Chapter #14**

**Section 1**

**6**. Air-Conditioning Repairs. Richard’s Heating and Cooling in Prescott, Arizona, charges $55 per hour plus a $30 service charge. Let x denote the number of hours required for a job, and let y denote the total cost to the customer.

a. Find the equation that expresses y in terms of x.

b. Determine b0 and b1.

c. Construct a table similar to Table 14.1 on page 630 for the x-values 0.5, 1, and 2.25 hours.

d. Draw the graph of the equation that you determined in part (a) by plotting the points from part (c) and connecting them with a line.

e. Apply the graph from part(d) to estimate visually the cost of a job that takes 1.75 hours. Then calculate that cost exactly by using the equation from part (a).

1. **y = 30 + 55x**
2. **b0 (y intersection) = 30**

**b1 (slope) = 55**

c)

|  |  |
| --- | --- |
| **X (hours)** | **Y (cost)** |
| 0.5 | 57.5 |
| 1 | 85 |
| 2.25 | 153.75 |

1. **Excel file**

**e)** **Visual Estimation for 1.75 in Excel file.  
 Calculation using the equation from part (a): y = 30 + 55 \* 1.75 = 126.25**

**8**. A Law of Physics. A ball is thrown straight up in the air with an initial velocity of 64 feet per second (ft/sec). According to the laws of physics, if you let y denote the velocity of the ball after x seconds, y = 64 − 32x.

a. Determine b0 and b1 for this linear equation.

b. Determine the velocity of the ball after 1, 2, 3, and 4 sec.

c. Graph the linear equation y=64−32x,using the four points obtained in part (b).

d. Use the graph from part (c) to estimate visually the velocity of the ball after 1.5 sec. Then calculate that velocity exactly by using the linear equation y = 64 − 32x.

1. **b0 = 64 | b1 = -32**
2. **Excel file**
3. **Excel file**
4. **Visual Estimation for 1.5 sec in Excel file**

**Calculation using the equation: y = 64 – 32\*1.5 = 16**

In Exercises 14.9–14.12,

a. Find the y-intercept and slope of the specified linear equation.   
b. Explain what the y-intercept and slope represent in terms of the graph of the equation.

c. Explain what the y-intercept and slope represent in terms relating to the application.

9. Rental-Car Costs. *y* = 68.22 + 0.25*x* (from Exercise 14.5)

**a) y-intercept = 68.22  
 slope = 0.25**

**b) y-intercept = point where the given line intersects the y-axis  
 slope = indicates the amount of how much the y changes within the every change of x in one unit**

**c) y-intercept 68.22 is the amount of rental-car cost when the number of miles driven is 0  
 slope 0.25 is the extra amount for each mile passed**

**Section 2**

In Exercises 14.40 and 14.41,

a. Graph the linear equations and data points.  
b. Construct tables for x, y, yˆ, e, and e2 similar to Table 14.4 on page 636.  
c. Determine which line fits the set of data points better, according to the least-squares criterion.

40. Line A: y=1.5+0.5x   
 Line B: y = 1.125 + 0.375x



1. **Excel file**
2. **Excel file**
3. **Excel file**

In each of Exercises 14.44–14.49,

a. Find the regression equation for the data points.  
b. Graph the regression equation and the data points.

45.



a)

  
  
 **Sxx = = 14 – 12 = 2  
 Sxy = = -22 + 18 = -4  
 Syy = = 41 – 27 = 14**

**b1 = = -4/2 = -2   
 b0 = 1/n( = 1/3(-9 – (-2)\*6) = 1/3 \* 3 = 1**

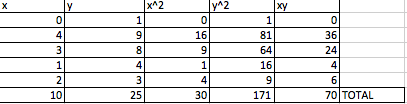
**Regression Equation: y=b0 + b1x => y= 1 – 2x**

**b) Excel File**

46.



a)



**Sxx = = 30 – 20 = 10  
 Sxy = = 70 – 50 = 20  
 Syy = = 171 – 125 = 46**

**b1 = = 20/10 = 2   
 b0 = 1/n( = 1/5(25 – 2\*10) = 1/5 \* 5 = 1  
Regression Equation: y=b0 + b1x => y = 1 + 2x  
b) Excel File**

56. For which of the following sets of data points can you reasonably determine a regression line? Explain your answer.



**For option number 1 we can reasonably determine a regression line, because the data points are plotted in that way that all of them can be fitted in between two parallel lines.**

**Section 3**

In Exercises 14.82–14.87, we repeat the data and provide the regression equations for Exercises 14.44–14.49. In each exercise,

a. Compute the three sums of squares, SST, SSR, and SSE, using the defining formulas (page 649).

b. Verify the regression identity, SST = SSR + SSE.

c. Compute the coefficient of determination.

d. Determine the percentage of variation in the observed values of the response variable that is explained by the regression.

e. State how useful the regression equation appears to be for making predictions. (Answers for this part may vary, owing to different interpretations.)

83.



**Calculations performed based on the table in the attached Excel file.**

1. **SST = = 14**

***SSR* = = 8  
*SSE* = = 6**

1. **SST = SSR + SSE = 14 = 8+6**
2. **= 8/14 = 0.571**
3. **Pretty useful because we can see how our data is plotted.**

84.



1. **SST = = 46**

***SSR* = = 40  
*SSE* = = 6**

1. **SST = SSR + SSE = 46 = 40 + 6**
2. **= 40/46 = 0.869**
3. **86.9 %**
4. **Pretty useful because we can see how our data is plotted.**

**Section 4**

In Exercises 14.116–14.121, we repeat data from exercises in Section 14.2. For each exercise, determine the linear correlation coefficient by using

a. Definition 14.7 on page 656.

b. Formula 14.3 on page 656.

Compare your answers in parts (a) and (b).

117.



1. **r =**

**b) r = =**

118.



1. **r =**
2. **r = =**

129. Consider the following set of data points.



a. Compute the linear correlation coefficient, r.

b. Can you conclude from your answer in part (a) that the variables x and y are unrelated? Explain your answer.

c. Draw a scatter plot for the data.

d. Is use of the linear correlation coefficient as a descriptive measure for the data appropriate? Explain your answer.

e. Show that the data are related by the quadratic equation y = x2. Graph that equation and the data points.

1. **r = =**
2. **We can’t conclude if they are related, because there is no linear relation between the variables.**
3. **Excel file**
4. **Linear correlation coefficient in this case would not be appropriate because the data is not scatter as a line. (We have a parabola)**
5. **Excel file**