

Answer on Question #41806, Math, Statistics and Probability

Company A is a microcomputer producer. The following data represents Company A's yearly sales volume and its advertising expenditures over a period of 8 years. Sales in millions of dollars and advertising is in \$10,000.

1993 15 32

1994 16 33

1995 18 35

1996 17 34

1997 16 36

1998 16 36

1999 19 39

2000 24 42

Using the method of least squares, what is the estimated regression line between sales and advertising, and the predicted sales in dollars, with an advertising expenditure of \$400K actual dollars as scaled to 40.

- a. Sales = -10.4211 + .7895 Advertising: Sales \$315,790
- b. Advertising = 16.7143 + 1.0714 Sales: Sales \$59.57 Million
- c. Sales = .7895 + 10.421 Advertising: Sales \$416.63 Million
- d. Sales = -10.4211 + .7895 Advertising: Sales = \$21.16 Million
- e. None of the Above

Solution

	x (Advertising)	y (Sales)	xy	x ²
1993	32	15	480	1024
1994	33	16	528	1089
1995	35	18	630	1225
1996	34	17	578	1156
1997	36	16	576	1296
1998	36	16	576	1296
1999	39	19	741	1521
2000	42	24	1008	1764
Total	287	141	5117	10371

Calculate the slope.

$$m = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} = \frac{5117 - \frac{287 \cdot 141}{8}}{10371 - \frac{287^2}{8}} = \frac{58.625}{74.875} = 0.7830.$$

Calculate the y-intercept.

$$b = \frac{\sum y}{n} - m \cdot \frac{\sum x}{n} = \frac{141}{8} - 0.783 \cdot \frac{287}{8} = -10.4651.$$

Thus

$$\text{Sales} = -10.4651 + 0.7830 \cdot \text{Advertising.}$$

$$\text{Sales (40)} = -10.4651 + 0.7830 \cdot 40 = \$20.85 \text{ Million.}$$

Answer: e. None of the Above.