Homework 10

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**Problem - 1:** Max believes that the sales of coffee at his coffee shop depend upon the weather. He has taken a sample for 5 days. Below you are given the results of the sample.

|  |  |
| --- | --- |
| Cups of Coffee Sold | Temperature |
| 350 | 50 |
| 200 | 60 |
| 210 | 70 |
| 100 | 80 |
| 60 | 90 |
| 40 | 100 |

**a)** Which variable is the dependent variable?

**Ans:** The Dependent Variable is “Cups of coffee sold”.

**b)** Compute the least squares estimated line.

**Ans:** refer to the excel sheet

**c)** Compute the correlation coefficient between temperature and the sales of coffee.

**Ans:** refer to the excel sheet

**d)** Predict sales of a 90-degree day.

**Ans:** refer to the excel sheet

**Problem - 2 :** The following data represent a company's yearly sales volume and its advertising expenditure over a period of 8 years.

|  |  |  |
| --- | --- | --- |
| Year | Sales in Millions of Dollars | Advertising in ($10000) |
| 1994 | 15 | 32 |
| 1995 | 16 | 33 |
| 1996 | 18 | 35 |
| 1997 | 17 | 34 |
| 1998 | 16 | 36 |
| 1999 | 19 | 37 |
| 2000 | 19 | 39 |
| 2001 | 24 | 42 |

**a)** Develop a scatter diagram of sales versus advertising.

**Ans:** refer to the excel sheet

**b)** Use the least-squares method to compute an estimated regression line between sales

and advertising.

**Ans:** refer to the excel sheet

**c)** If the company's advertising expenditure is $400,000, what are the predicted sales?

**Ans:** refer to the excel sheet

**d)** What does the slope of the estimated regression line indicate?

**Ans:** The slope of 0.7895 means that each unit increase in advertising results in a 0.789 increase in sales.

**e)** Compute the coefficient of determination and fully interpret its meaning.

**Ans:** refer to the excel sheet

**Problem - 3:** A market research analyst for a brand of cereal is interested in finding out if there is a relationship between the sales generated and the shelf space used to display the cereal. She conducted a study and collected data from 12 different stores selling this brand of cereal.

|  |  |
| --- | --- |
| Shelf Space, Sq in | Sales, $ |
| 574 | 960 |
| 635 | 1779 |
| 533 | 651 |
| 560 | 831 |
| 628 | 1460 |
| 615 | 1370 |
| 540 | 851 |
| 587 | 1220 |
| 656 | 1889 |
| 594 | 1370 |
| 622 | 1609 |
| 567 | 1120 |

The data contains sales $ generated for a certain month and the shelf space dedicated to the product. Analyze this data using the appropriate method (Compute regression equation and the coefficient of determination).

**Ans:** refer to the excel sheet

**Problem – 4:** The following data show the brand, price ($), and overall score for stereo headphones that were tested by Consumer Reports. The overall score is based on sound quality and the effectiveness of ambient noise reduction. Scores range from (lowest) to (highest)

|  |  |  |
| --- | --- | --- |
| Brand | Price | Score |
| Bose | 180 | 76 |
| Skullcandy | 150 | 71 |
| Koss | 95 | 61 |
| Phillips/O'Neill | 70 | 56 |
| Denon | 70 | 40 |
| JVC | 35 | 26 |

**(a)** Compute the estimated regression equation.

**Ans:** refer to the excel sheet

**(b)** Compute SST, SSR, and SSE. (Three decimal places).

**Ans:** refer to the excel sheet

**(c)** Compute the coefficient of determination. (Three decimal places).

**Ans:** refer to the excel sheet

**(d)** What is the value of the sample correlation coefficient? (Three decimal places).

**Ans:** refer to the excel sheet

**Problem - 5 :** Case Study

As part of a study on transportation safety, the U.S. Department of Transportation collected data on the number of fatal accidents per 1000 licenses and the percentage of licensed 3 drivers under the age of 21 in a sample of 42 cities. Data collected over one year follow. These data are contained in the file Safety.

**a)** Develop numerical and graphical summaries of the data.

**Ans:** refer to the excel sheet

**b)** Use regression analysis to investigate the relationship between the number of fatal

accidents and the percentage of drivers under the age of 21. Discuss your findings.

**Ans:** refer to the excel sheet

**c)** What conclusion and recommendations can you derive from your analysis?

**Ans:** A coefficient of determination of 0.7 shows a high or positive association between the two circumstances presented, and my recommendation is to strengthen safety measures and raise awareness.