2. Multiple Regression Model

 Suppose a large consumer product company wants to measure the effectiveness of different types of advertising media in the promotion of its products. Specifically, two types of advertising media are to be considered: (1) radio and TV advertising, and (2) newspaper advertising including the cost of discount coupons. A sample of 22 cities with approximately equal populations is selected for study during a test period of 1 month. Each city is allocated a specific expenditure level for both types of advertising. The sales of the product (in thousands of dollars) and also the level of media expenditure during the test month are recorded as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| City | Radio & TV Advertising ($000) | Newspaper Advertising ($000) | Sales ($000) |
| 1 | 0 | 40 | 973 |
| 2 | 0 | 40 | 1,119 |
| 3 | 25 | 25 | 875 |
| 4 | 25 | 25 | 625 |
| 5 | 30 | 30 | 910 |
| 6 | 30 | 30 | 971 |
| 7 | 35 | 35 | 931 |
| 8 | 35 | 35 | 1,177 |
| 9 | 40 | 25 | 882 |
| 10 | 40 | 25 | 982 |
| 11 | 45 | 45 | 1,628 |
| 12 | 45 | 45 | 1,577 |
| 13 | 50 | 0 | 1,044 |
| 14 | 50 | 0 | 914 |
| 15 | 55 | 25 | 1,329 |
| 16 | 55 | 25 | 1,330 |
| 17 | 60 | 30 | 1,405 |
| 18 | 60 | 30 | 1,436 |
| 19 | 65 | 35 | 1,521 |
| 20 | 65 | 35 | 1,741 |
| 21 | 70 | 40 | 1,866 |
| 22 | 70 | 40 | 1,717 |

Using Megastat correlation/regression or MS EXCEL regression function under TOOLS menu, Data Analysis:

1.       Find the coefficient of multiple correlation (R) between sales and advertising costs. Interpret the result. [hint: First, enter advertisement and sales data in Excel. Highlight the y-cell range. Highlight all x-cell ranges at once].

2.       Find the coefficient of multiple determination (R2). Interpret the result.

3.       Predict the average sales for a city in which radio and TV advertising is $20,000 and newspaper advertising is $20,000 [use 20 instead of 20,000 in the equation].