# LAB 5: Multiple Linear Regression (Part II)

**Ex. 1:** The electric power consumed each month by a chemical plant is thought to be related to the average ambient temperature (x1), the number of days in the month (x2), the average product purity (x3), and the tons of product produced ( x4). The past year’s historical data are available and are presented in the following table. Fit a multiple linear regression model to these data.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **x1** | **x2** | **x3** | **x4** | **Y** |
| 25 | 24 | 91 | 100 | 240 |
| 31 | 21 | 90 | 95 | 236 |
| 45 | 24 | 88 | 110 | 270 |
| 60 | 25 | 87 | 88 | 274 |
| 65 | 25 | 91 | 94 | 301 |
| 72 | 26 | 94 | 99 | 316 |
| 80 | 25 | 87 | 97 | 300 |
| 84 | 25 | 86 | 96 | 296 |
| 75 | 24 | 88 | 110 | 267 |
| 60 | 25 | 91 | 105 | 276 |
| 50 | 25 | 90 | 100 | 288 |
| 38 | 23 | 89 | 98 | 261 |

**Ex 2:** An article in IEEE Transactions on Instrumentation and Measurement (2001, Vol. 50, pp. 2033–2040) reported on a study that had analyzed powdered mixtures of coal and limestone for permittivity. The error in the density measurement was the response. The data are reported in following table:

1. Fit a multiple linear regression model to these data with the density as the response.
2. Use the model to predict the density when the dielectric constant is 2.5 and the loss factor is 0.03.

|  |  |  |
| --- | --- | --- |
| Density | Dielectric Constant | Loss Factor |
| 0.749 | 2.05 | 0.016 |
| 0.798 | 2.15 | 0.02 |
| 0.849 | 2.25 | 0.022 |
| 0.877 | 2.3 | 0.023 |
| 0.929 | 2.4 | 0.026 |
| 0.963 | 2.47 | 0.028 |
| 0.997 | 2.54 | 0.031 |
| 1.046 | 2.64 | 0.034 |
| 1.133 | 2.85 | 0.039 |
| 1.215 | 3.05 | 0.045 |