**In-class problems – Regression and Application**

**CIVL 7012/8012: Probabilistic Methods for Engineers**

**Question 1:** (Reference Problem 1) For the same 10 zones, conduct three sets of multiple regression using an appropriate software as follows:

* 1. Between Y and X2 and X3
  2. Between Y and X2, X3 and X4
  3. Between Y and ln X1
  4. Between Y and X1

Provide a brief description of the ANOVA, standard error of the estimate, R2-value and t-statistics. Also check the results of your manual analysis in problem 1a) with the computer solution (d above).

Which one of the four equations would you recommend and why?

**Table 1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Zone No. | Employment | | | | Peak-hour Trips Attracted (Y) |
| Total (X1) | Manufacturing (X2) | Retail & Services (X3) | Other (X4) |
| 1 | 9,220 | 6,600 | 2,500 | 120 | 9,500 |
| 2 | 2,045 | 125 | 1,905 | 15 | 2,200 |
| 3 | 574 | 228 | 87 | 259 | 330 |
| 4 | 127 | 0 | 127 | 0 | 153 |
| 5 | 3,850 | 2,750 | 800 | 300 | 3,960 |
| 6 | 995 | 105 | 805 | 85 | 1,200 |
| 7 | 223 | 165 | 58 | 0 | 240 |
| 8 | 36 | 6 | 30 | 0 | 55 |
| 9 | 2,250 | 1,560 | 515 | 175 | 2,100 |
| 10 | 209 | 36 | 173 | 0 | 230 |

**Question-2:** Use an appropriate software package to calibrate a model of the form 10y = AXB.

X: 45 6 25 11 5 16 19 11 15 22

Y: 1.5 4.1 2.1 2.7 4.1 2.1 2.5 2.8 1.9 2.0

**Question-3:** Data shown relating to the daily person-trip productions per dwelling unit (Y) and residential density (X) dwelling units per acre. Use an appropriate software package to calibrate a model of the form Y = (a + bX)-1.

X: 3.5 6.5 4.0 2.3 6.2 3.0 4.4 3.3 6.0

Y: 31.0 11.0 45.0 68.0 11.0 22.0 43.0 35.0 11.0