***Practical 2***

***Randomized Block Design***

**Example 1**

Consider the hardness testing experiment. Suppose that the experiment was conducted as in Randomized Block Design and the following Rockwell C-scale data (Coded by subtracting 40 units) obtained:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tip | Coupon | | | |
| 1 | 2 | 3 | 4 |
| 1 | 9.3 | 9.4 | 9.8 | 10.0 |
| 2 | 9.4 | 9.3 | 9.8 | 9.9 |
| 3 | 9.2 | 9.4 | 9.5 | 9.7 |
| 4 | 9.7 | 9.6 | 10.0 | 10.2 |

1. Analyze the data from this experiment.
2. Use the Fisher LSD method to make comparison among the four tips to determine specifically which tips differ in mean hardness reading.
3. Analyze the residuals from this experiment.

(Reference: “Design and Analysis of Experiments”, 7th Ed., Douglas C. Montgomery, pg. 158 (4.10))

**Example: 2**

The effect of three different lubricating oils on fuel economy in diesel truck engines is being studied. Fuel economy is measured using break-specific fuel consumption after the engines are available for study, and the experimenters conduct the following randomized complete block design.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| oil | Truck | | | | |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 0.500 | 0.634 | 0.487 | 0.329 | 0.512 |
| 2 | 0.535 | 0.675 | 0.520 | 0.435 | 0.540 |
| 3 | 0.513 | 0.595 | 0.488 | 0.400 | 0.510 |

1. Analyze the data from this experiment.
2. Use the Fisher LSD method to make comparison among the three lubricating oils to determine specifically which oils differ in break-specific fuel consumption.
3. Analyze the residuals from this experiment.

(Reference: “Design and Analysis of Experiments”, 7th Ed., Douglas C. Montgomery, pg. 157 (4.8))