Factorial Experiment

- Treatment 1 (A): two levels (A1, A2)
- Treatment 2 (B): three levels (B1, B2, B3)
- Treatment 3 (C): five levels (C1, C2, C3, C4, C5)
- Interaction (AB, AC, BC)
- Total levels: 2 * 3 * 5 = 30
- Total runs: 30 runs
- Total combinations: 30 combinations
- Total observations: 300 observations

Data:

- Treatment 1 (A):
  - A1: 2 observations
  - A2: 28 observations

- Treatment 2 (B):
  - B1: 10 observations
  - B2: 10 observations
  - B3: 10 observations

- Treatment 3 (C):
  - C1: 5 observations
  - C2: 5 observations
  - C3: 5 observations
  - C4: 5 observations
  - C5: 5 observations

Calculations:

- Among treatments (SST):
  \[ \text{SST} = \left( \sum y^2 \right) - \text{CM} \]
  \[ = 22,238 - 20,353.7778 = 1,884.222 \]

- Error (SSE):
  \[ \text{SSE} = \text{SST} - \text{SSA} \]
  \[ = 1,884.222 - 473.3333 = 1,410.8889 \]

- Overall mean (CM):
  \[ \text{CM} = \frac{\sum y^2}{n_T} = \frac{(856)^2}{36} = 20,353.7778 \]

- Sum of squares for treatments (SSA):
  \[ \text{SSA} = \frac{A_1^2 + A_2^2}{bn} - \text{CM} \]
  \[ = \frac{1489.96 + 920.990}{18} - 20,549.7778 = 196.0000 \]
\[ SS_B = \frac{\text{B}^2}{\text{an}} = 156.2222 \]

\[ SS_{A \times B} = SS_T - SS_A - SS_B = 1058.6667 \]

**ANOVA Table**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>196.066</td>
<td>196.066</td>
<td>12.42</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>156.2222</td>
<td>78.1111</td>
<td>4.95</td>
</tr>
<tr>
<td>A \times B</td>
<td>2</td>
<td>1058.6667</td>
<td>529.3333</td>
<td>33.55</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>473.3333</td>
<td>15.7778</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>1884.2222</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>