Section 12.1

\[ \text{One-Way Analysis of Variance (ANOVA)} \]

Equal sample sizes for each sample.

Comparing means from 3 or more samples.

* This is simplest when all sample sizes \( (n) \) are all equal.

Temperatures of sick patients after receiving a treatment:

<table>
<thead>
<tr>
<th>Placebo</th>
<th>Aspirin</th>
<th>Anacin</th>
<th>Tylenol</th>
<th>Bufferin</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.3</td>
<td>96.6</td>
<td>97.2</td>
<td>95.1</td>
<td>96.1</td>
</tr>
<tr>
<td>98.7</td>
<td>95.3</td>
<td>96.8</td>
<td>95.4</td>
<td>96.5</td>
</tr>
<tr>
<td>98.1</td>
<td>98.1</td>
<td>97.8</td>
<td>95.7</td>
<td>98.2</td>
</tr>
<tr>
<td>99.9</td>
<td>94.4</td>
<td>94.7</td>
<td>93.7</td>
<td>94.5</td>
</tr>
<tr>
<td>96.2</td>
<td>96.6</td>
<td>97.0</td>
<td>95.3</td>
<td>96.5</td>
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<tr>
<td>98.3</td>
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<td>96.8</td>
<td>95.3</td>
<td>96.2</td>
</tr>
</tbody>
</table>

\[ X = 99.30 \quad 96.20 \quad 96.83 \quad 95.30 \quad 96.20 \]

\[ s = 1.10 \quad 1.11 \quad 1.00 \quad 1.11 \quad 1.13 \]

\[ s^2 = 1.21 \quad 1.22 \quad 1.00 \quad 1.22 \quad 1.29 \]

\[ n = 7 \quad 7 \quad 7 \quad 7 \quad 7 \]

Hypotheses:

\[ H_0: \mu_1 = \mu_2 = \mu_3 = \ldots = \mu_k \]

\[ H_1: \text{at least one mean is different} \]

Gather data: \( \bar{x}, s^2, n \) from each sample. \( k = \# \) of pop's/treatments.

Requirements: All populations are normal with equal variances (these are not strict).

Test Statistic:

\[ F = \frac{n s^2_x}{s^2_p} \]

\[ s^2_x = 1.11 \quad s^2 = \frac{1.21 + 1.22 + 1.00 + 1.22 + 1.29}{5} = 1.188 \]

\[ F = \frac{7 \times 1.2366}{1.188} = 7.2864 \]