1. (a) \( s_p = \sqrt{\text{MSE}} = \sqrt{110} = 10.488 \)
   (b) i. \( 70.0 \pm 2.447 \frac{8.16}{\sqrt{7}} = 70.0 \pm 7.547 = (62.453, 77.547) \)
   ii. \( 70.0 \pm 2.064 \frac{10.47}{\sqrt{7}} = 70.0 \pm 8.168 = (61.832, 78.168) \)
   (c) Brand A | Brand B | Brand C | Brand D

2. \( H_0: \mu_1 = \mu_2 = \mu_3 \) vs. \( H_1: \mu_i \neq \mu_j \) for some \( i \neq j \)

\[
\begin{align*}
\text{SST} &= \left[ \frac{9^2}{3} + \frac{29^2}{5} + \frac{16^2}{4} \right] - \frac{(9 + 29 + 16)^2}{3 + 5 + 4} = 259.2 - 243.0 = 16.2 \\
\text{SSE} &= (29 + 181 + 68) - \left[ \frac{9^2}{3} + \frac{29^2}{5} + \frac{16^2}{4} \right] = 278 - 259.2 = 18.8 \\
F^* &= \frac{16.2/(3-1)}{18.8/(12-3)} = 3.878 \\
\text{RR: } \{F \geq F_{10,2,9} = 3.01\} \\
\text{Reject } H_0
\]

3. (a) Temperature: 2 levels
   Humidity: 3 levels
   (b) See below.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>( F^* )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>1</td>
<td>5.633</td>
<td>5.633</td>
<td>3.71</td>
</tr>
<tr>
<td>Humidity</td>
<td>2</td>
<td>65.067</td>
<td>32.534</td>
<td>21.45</td>
</tr>
<tr>
<td>Interaction</td>
<td>2</td>
<td>13.867</td>
<td>6.933</td>
<td>4.57</td>
</tr>
<tr>
<td>Error</td>
<td>24</td>
<td>36.400</td>
<td>1.517</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>120.967</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

(c) \( F_{0.05,2,24} = 3.40 \)
(d) Yes. The \( p \)-value for the interaction term is .021, which is less than \( \alpha = .05 \).
(e) It is inappropriate to examine the main effects. Because a significant interaction is present, the effects of both factors must be present. However, such effects may not be reflected in the analyses of the main effects.