The data below are intelligence test scores for 38 adopted children categorized according to whether they child’s biological & adopted parents fell into the highest or lowest socio-economic status (SES). (Low SES means being poor, high SES means being wealthy.) – SES I: both sets of parents were in low SES; SES II: biologic parents were in high SES, adopted parents were in low SES; SES III: biologic parents were in low SES, adopted parents were in high SES; SES IV: both sets of parents were in high SES.

<table>
<thead>
<tr>
<th>Group</th>
<th>Sample Size</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SES I</td>
<td>10</td>
<td>92.4</td>
<td>15.41</td>
</tr>
<tr>
<td>SES II</td>
<td>8</td>
<td>107.5</td>
<td>11.94</td>
</tr>
<tr>
<td>SES III</td>
<td>10</td>
<td>103.6</td>
<td>12.71</td>
</tr>
<tr>
<td>SES IV</td>
<td>10</td>
<td>119.6</td>
<td>12.24</td>
</tr>
</tbody>
</table>

\[
MSE = s_p^2 = \frac{9(15.41)^2 + 7(11.94)^2 + 9(12.71)^2 + 9(12.24)^2}{34} = \frac{5937.41}{34} = 174.63, s_p = 13.21
\]

Consider all 6 pairwise confidence intervals comparing the 4 groups. Control your familywise error rate at 0.05, using the Bonferroni method. In the interest of time... simply calculate the two CI for \( \mu_{\text{SES I}} - \mu_{\text{SES II}} \) and \( \mu_{\text{SES III}} - \mu_{\text{SES IV}} \).

**Solution:**

95% CI for \( \mu_{\text{SES I}} - \mu_{\text{SES II}} \):

\[
\bar{X}_{\text{I}} - \bar{X}_{\text{II}} \pm t_{1-\alpha/(2\cdot6), n_T - 4} s_p \sqrt{\frac{1}{10} + \frac{1}{8}}
\]

\[
92.4 - 107.5 \pm 2.8 \cdot 13.21 \sqrt{0.225}
\]

\[
(-32.64, 2.44)
\]

We’re 95% confident that the true difference in average IQ scores for SES I compared to SES II is between -32.64 and 2.44 points. Our results are borderline, suggesting that with a slightly lower confidence, we might conclude that the average IQ for SES II is higher than the average IQ for SES I.

95% CI for \( \mu_{\text{SES III}} - \mu_{\text{SES IV}} \):

\[
\bar{X}_{\text{III}} - \bar{X}_{\text{IV}} \pm t_{1-\alpha/(2\cdot6), n_T - 4} s_p \sqrt{\frac{1}{10} + \frac{1}{10}}
\]

\[
103.6 - 119.6 \pm 2.8 \cdot 13.21 \sqrt{0.2}
\]

\[
(-32.54, 0.54)
\]

We’re 95% confident that the true difference in average IQ scores for SES III compared to SES IV is between -32.54 and 0.54 points. Again, our results are borderline, and with a smaller degree of confidence, we would probably be able to conclude that the average IQ for SES IV is higher than the average IQ for SES III.