Math 158 – Spring 2009
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warm-up # 10

Name: _____

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.

group	sample size	mean	SD
SES I	10	92.4	15.41
SES II	8	107.5	11.94
SES III	10	103.6	12.71
SES IV	10	119.6	12.24

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

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 $\mu_{SESI} - \mu_{SESII}$ and $\mu_{SESIII} - \mu_{SESIV}$.

Solution:
95% CI for $\mu_{SESI} - \mu_{SESII}$:

$$\begin{aligned} \overline{X}_I - \overline{X}_{II} &\pm t_{1-\alpha/(2\cdot 6),n_T-4} s_p \sqrt{1/10 + 1/8} \\ 92.4 - 107.5 &\pm 2.8 \cdot 13.21 \sqrt{0.225} \\ & (-32.64, 2.44) \end{aligned}$$

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 $\mu_{SESIII} - \mu_{SESIV}$:

$$\begin{aligned} \overline{X}_{III} - \overline{X}_{IV} &\pm t_{1-\alpha/(2\cdot 6),n_T-4} s_p \sqrt{1/10 + 1/10} \\ 103.6 - 119.6 &\pm 2.8 \cdot 13.21 \sqrt{0.2} \\ & (-32.54, 0.54) \end{aligned}$$

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.