Homework 13

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December 3, 2023

Problem 8.62
Part a:
$z_{0.005} = 2.576$
$24.8 - 21.3 \pm 2.576\sqrt{\frac{(7.1)^2}{34} + \frac{(8.1)^2}{41}}$
$= (-1.02, 8.02)$

Part b:
With 99% confidence, the difference in the mean molt time for normal males versus those split from their mates is between (-1.02, 8.02).

Problem 8.70
Part a:
n = 1.962 * 0.9 * (1-0.9) / 0.052 = 138.3
sample size = 139 rounded to the nearest integer

Part b:
when no information about p is given, then p=0.5
n = 1.962 * 0.5 * (1-0.5) / 0.052 = 384.16
sample size = 385 rounded to the nearest integer

Problem 8.80
$\bar{x} = 26.6$ = sample mean. $\sigma = 7.4$ = standard deviation. $n = 21$ = sample size
The 95% confidence interval is given by: $\bar{x} \pm t_{\alpha/2}\frac{\sigma}{\sqrt{n}}$
t has n-1 = 21-1 = 20 degrees of freedom
Since $\alpha = 0.05, t_{\alpha/2} = t_{0.05/2} = t_{0.025} = 2.086$
$26.6 \pm 2.086\frac{7.4}{\sqrt{21}} = (23.2315, 29.9685)$

Problem 8.90
Part a:
the pooled sample variance is $s_p^2 = \frac{14(42)^2+14(45)^2}{28} = 1894.5$
so the 95% CI for the difference in mean verbal scores is $446 - 534 \pm 2.048\sqrt{1894.5(2/15)} = -88 \pm 32.55 = (-120.55, -55.45)$

Part b:
the pooled sample variance is $s_p^2 = \frac{14(57)^2+14(52)^2}{28} = 2976.5$
so the 95% CI for the difference in mean math scores is $548 - 517 \pm 2.048\sqrt{2976.5(2/15)} = 31 \pm 40.80 = (-9.8, 71.8)$

Part c:
At the 95% confidence level, there seems to be a difference in the two mean verbal SAT scores achieved by the two groups. But a difference is not seen in the math scores.

Part d:
We assumed that the sample measurements were independently drawn from normal populations with a $\sigma_1 = \sigma_2$

Problem 8.95
Given the sample data, n=6 and $s^2 = 0.503$. So $\chi^2_{0.95} = 1.145476$. Then $\chi^2_{0.05} = 11.0705$ having degrees of freedom = 5. The 90 percent CI for σ^2 is $(\frac{5(0.503)}{11.0705}, \frac{5(0.503)}{1.145476}) = (0.227, 2.196)$ so we are 90% confident that σ^2 is in this interval.