Homework for Module 2

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8.1.1 Using $n = 31$, $\bar{x} = 53.42$, $\sigma = s = 3.05$, $t = 0.025, 30$

$$\begin{aligned}
&(\bar{x} - \frac{t_{\frac{\alpha}{2}, n-1^s}}{\sqrt{n}}, \bar{x} + \frac{t_{\frac{\alpha}{2}, n-1^s}}{\sqrt{n}}) \\
&(53.42 - \frac{2.042 \times 3.05}{\sqrt{31}}, 53.42 + \frac{2.042 \times 3.05}{\sqrt{31}}) \\
&= (52.3135, 54.5386)
\end{aligned}$$

8.1.9 Using $n = 31$, $\bar{x} = 53.42$, $\sigma = s = 3.05$

$$\begin{aligned}
n &\geq 4 \times (\frac{t_{\frac{\alpha}{2}, n-1^s}}{L_0})^2 \\
&\geq 4 \times (\frac{2.042 \times 3.05}{2})^2 \\
&\geq 38.7892 \\
&= 39 - 31 \\
&= 8\text{more}
\end{aligned}$$

8.1.5 Using $n = 29$, $\bar{x} = 415.7$, $\sigma = 10.0$, find c for $\mu \in (-\infty, c)$ with 1-sided 99% confidence interval.

$$\begin{aligned}
c &= \bar{x} + \frac{z_\alpha \sigma}{\sqrt{29}} \\
&= 415.7 + \frac{2.326 \times 10}{\sqrt{29}} \\
&= 420.0193
\end{aligned}$$

This is plausible since the result is less than 418.0.

10.1.1

1. Using $z_{0.005} = 2.576$

$$\begin{aligned}
&(\frac{11}{32} - \frac{2.576}{32} \times \sqrt{\frac{11 \times (32 - 11)}{32}}, \frac{11}{32} + \frac{2.576}{32} \times \sqrt{\frac{11 \times (32 - 11)}{32}}) \\
&(0.1275, 0.5601)
\end{aligned}$$

2. Using $z_{0.025} = 1.960$

$$(\frac{11}{32} - \frac{1.960}{32} \times \sqrt{\frac{11 \times (32-11)}{32}}, \frac{11}{32} + \frac{1.960}{32} \times \sqrt{\frac{11 \times (32-11)}{32}})$$
$$(0.1792, 0.5084)$$

3. Using $z_{0.001} = 2.326$

$$(\frac{11}{32} - \frac{2.326}{32} \times \sqrt{\frac{11 \times (32-11)}{32}}, \frac{11}{32} + \frac{2.326}{32} \times \sqrt{\frac{11 \times (32-11)}{32}})$$
$$(0.1792, 0.5084)$$

EX DL1

Table 1: 95% Confidence Interval

First half of the year:	15.5245
Second half of the year:	14.6553