STA237 - Activity 8

Madeline Ahn

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1. Let $Y \to$ Score. We have $\mu = 60, \sigma^2 = 64$, so $\sigma = 8$.
   We want to find $P(\overline{y} \leq 58)$.
   First, calculate the distribution for $\overline{y}$. Let $n = 100$. Then:

   $$\frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{100}} = \frac{8}{10} = 0.8$$

   By Central Limit Theorem, $\overline{y} \sim N(60, 0.8)$.
   Now, we can calculate $P(\overline{y} \leq 58)$.

   $$\begin{aligned} P(\overline{y} \leq 58) &= P\left(\frac{\overline{y} - \mu_{\overline{y}}}{\sigma_{\overline{y}}}\right) \\ &= P(Z \leq -2.5) \\ &= 0.0062, \text{ using the Standard Normal Dist. Table.} \end{aligned}$$

   Hence, other schools are considered better than the selected school.

2. We have $n = 100$, with $y \to$ Service Time, with $\mu = 1.5$ minutes and $\sigma = 1$.
   So:

   $$\begin{aligned} P(\sum_{i=1}^{n} y_1 < 2\cot 60) &= P(\frac{1}{n}\sum_{i=1}^{n} y_1 < \frac{120}{100}) \\ &= P(\overline{y} < 1.2) \end{aligned}$$

   Using Central Limit Theorem, we have:

   $$SD(\overline{y}) = \frac{\sigma}{\sqrt{n}} = \frac{1}{10} = 0.1$$

   Then, $\overline{y} \sim N(1.5, 0.1)$. Hence:

   $$\begin{aligned} P(\overline{y} < 1.2) &= P(Z < \frac{1.2 - 1.5}{0.1}) \\ &= P(Z < -3) \\ &= 0.0013 \end{aligned}$$