1. **Problem**
You will perform a single-sample t test of the alternative hypothesis claiming $\mu < 158$. Before collecting the sample, you decide to use a significance level $\alpha = 0.05$. The sample has the following attributes:

$$\begin{aligned} n &= 3 \\ \bar{x} &= 67.31 \\ s &= 25.54 \end{aligned}$$

What is your conclusion?

(a) Reject the null hypothesis

(b) Retain the null hypothesis

Solution
We state the hypotheses:

$$\begin{aligned} H_0 &: \quad \mu = 158 \\ H_A &: \quad \mu \neq 158 \end{aligned}$$

We estimate the standard error (same way as with z testing).

$$SE = \frac{s}{\sqrt{n}} = \frac{25.54}{\sqrt{3}} = 14.746$$

We calculate the t score (same way as with z testing).

$$t = \frac{67.31 - 158}{14.746} = -6.15$$

We determine the degrees of freedom.

$$df = n - 1 = 2$$

We estimate the p-value from the T table.

$$0.01 < p\text{-value} < 0.02$$

We compare the p-value to α.

$$p\text{-value} < \alpha$$

We make our conclusion: we reject the null.