

STA237 - Activity 2

Madeline Ahn

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1. Let $Y \rightarrow$ tip resistance, which is a continuous random variable. It is given that $\mu = 2.2$, and $\sigma = 0.9$. Then, $Y \sim N(2.2, 0.9)$.

(a) We want to find $P(1.3 \leq Y \leq 4)$. We want to turn this into a standard normal distribution, so:

$$\begin{aligned} P(1.3 \leq Y \leq 4) &= P\left(\frac{1.3 - 2.2}{0.9} \leq Z \leq \frac{4 - 2.2}{0.9}\right) \\ &= P(-1 \leq Z \leq 2) \\ &= P(Z \leq 2) - P(Z < -1) \\ &= 0.9772 - 0.1587 \\ &= 0.8185 \end{aligned}$$

(b) We want to find $P(Y > 1)$.

$$\begin{aligned} P(Y > 1) &= 1 - P(Y \leq 1) \\ &= 1 - P\left(Z \leq \frac{1 - 2.2}{0.9}\right) \\ &= 1 - P(Z \leq -1.33) \\ &= 1 - 0.0918 \\ &= 0.9082 \end{aligned}$$

(c) We want to find T such that $P(Y > T) = 0.35$. We have:

$$\begin{aligned} P(Y > T) &= 0.35 \\ 1 - P(Y \leq T) &= 0.35 \\ \implies P(Y \leq T) &= 0.65 \end{aligned}$$

Then, $P(Z \leq \frac{T-2.2}{0.9}) = 0.65$. Using the table, we have $\frac{T-2.2}{0.9} = 0.39$, so:

$$\begin{aligned} T &= 2.2 + 0.9 \cdot 0.39 \\ &= 2.551 \end{aligned}$$