

Finding Probability from a Given Quantity

Standardized intelligence quotient (IQ) tests are scaled so that the general population follows a $\text{Norm}(100, 15)$ distribution. A score of 70 or below is a clinical benchmark used alongside adaptive assessments to diagnose an “intellectual disability.”

1. Draw a rough bell curve representing this population, label the axis values at the mean and two standard deviations out, and shade the region representing the probability that a randomly chosen individual scores 70 or lower.

Reflection: Area as a Probability

Before executing any R code, we need to establish the connection between the geometry of your graph and the population. Quickly reviewing Section 6.5.2 in the textbook may help you here.

2. Write a full sentence explaining the relationship between the shaded area under the density curve from Step 1 and the probability of someone having a certain IQ score.

3. Now, translate your shaded region into formal mathematical notation:

Formal Notation: $P(X \leq \text{_____})$

My Rough Estimate from the Plot: _____%

4. **Textbook Dive:** Open your textbook and find the “New R Functions Used” reference block at the beginning of Chapter 7. Review the structural syntax for `pnorm()`. Pay close attention to how R defaults the logical argument `lower.tail` if you leave it blank.

Coding Corner: The Lower Tail

5. Open RStudio and calculate the precise proportion of the population expected to score 70 or lower by running a line of code very similar to that found in Example 7.2 of your textbook.

Code: _____

Precise Value: _____

Chapter 7

- # Chapter 7

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Chapter 7

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Chapter 7

Chapter 7

Chapter 7

Chapter 7

Chapter 7