Exam Prep: The Normal Distribution

1. **Multiple Choice:** Eddie Gaedel was the shortest person to ever play in Major League Baseball, standing at 43 inches tall. The height of US males is modeled with Norm(69, 3) (in inches). Which line of code finds the probability that a random US male is **shorter** than Eddie?

   A. `pnorm(q = 43, mean = 69, sd = 3, lower.tail = FALSE)`
   B. `pnorm(q = 69, mean = 43, sd = 3, lower.tail = TRUE)`
   C. `pnorm(q = 43, mean = 69, sd = 3, lower.tail = TRUE)`
   D. `pbinom(q = 43, mean = 69, sd = 3, lower.tail = TRUE)`

   Bill the Statypus says: Before doing anything, draw the bell curve with the given μ and σ. What area are we trying to find with R?

   Sally the Statypus says: Don't be fooled by option D, this is just a mean teacher trick of using the wrong function! Why must teachers be so sneaky?!?

2. **Geometric Estimation:** The annual rainfall in the Platypus River basin is Norm(40, 5) (in inches).

   (a) Use the Empirical Rule to estimate the probability that rainfall in a year is **less than 30 inches** or **more than 50 inches**.

   Sally the Statypus says: Check how many standard deviations 30 and 50 are from the mean of 40! Once you know that, the Empirical Rule tells you exactly how much of the "middle" you've excluded.

   (b) **Outlier Logic:** If you observe a year with 58 inches of rainfall, use the Empirical Rule to find a minimum percentage of years of which should have less than this level of rainfall.

   Bill the Statypus says: Realize that a z-score of 3.6 means it is to the right of a z-score of 3.

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