CONFIDENCE INTERVALS

A. Let Z be a standard normal random variable. Find a number z such that $P(-z < Z < z) = 0.95$. You may want to use the R command `qnorm(x)`.

B. Let X be a normally distributed random variable with mean μ (unknown) and standard deviation 2. Use the standardized random variable $Z = \dfrac{X - \mu}{2}$ in your solution to part A, then isolate μ to fill in the blanks:

$$P(X - \_\_\_\_\_ < \mu < X + \_\_\_\_\_) = 0.95$$

C. Now let $\overline{X}$ be the mean of a random sample of size 100 from a population with mean μ (unknown) and standard deviation 2. As in part B, fill in the blanks:

$$P(\overline{X} - \_\_\_\_\_ < \mu < \overline{X} + \_\_\_\_\_) = 0.95$$

D. Samples are taken and you find $\overline{x} = 7.767203$. Substitute this value in for $\overline{X}$ in part C to find the **95% confidence interval** for the population mean μ.

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E. What's wrong with the expression $P(7.375 < \mu < 8.159) = 0.95$?

F. Your 95% confidence interval is actually just the interval $(7.375, 8.159)$. What do these numbers mean? Try to give a non-technical explanation of the significance of this confidence interval.