

Week 5 Friday

Get Up And Move!

Move somewhere where you don't normally sit and/or next to someone you don't usually sit near! If you usually sit in the back, move forward. If you usually sit on the sides, move to the center.

Then introduce yourself to your new neighbors!

Sampling Distribution, Confidence Intervals

1. Suppose that roughly 20% of Americans are “nonreligious” in the sense that they do not identify with any religious group. Is it reasonable to expect that the sampling distribution for the sample proportion of nonreligious Americans with a sample size of 100 will be roughly normal?

(A) Yes

(B) No

(C) I don't know

2. You know that about 40% of French people can speak English, so the sampling distribution for the proportion of English speakers in simple random samples of 100 French people is roughly normal $N(0.4, \sqrt{(0.4 \cdot 0.6)/100}) \approx N(0.4, 0.05)$. Recall that roughly 68% of observations in a normal distribution are within 1 standard deviation of the mean. Which of the following is accurate?

- (A) 68% of French people have between 35% and 45% proficiency in English.
- (B) In 68% of simple random samples of 100 French people, the proportion of English speakers will be between 35% and 45%.
- (C) There is a 68% chance that between 35% and 45% of all French people speak English.
- (D) None of the above OR more than one of the above.

3. If you compute two confidence intervals for a parameter from a given sample, which will be wider: a 50% confidence interval, or a 95% confidence interval?

- (A) The 50% confidence interval
- (B) The 95% confidence interval
- (C) Both will be the same width
- (D) Not enough information to say

4. Heights of American men are roughly normally distributed with mean 70 inches and standard deviation 3 inches. The sampling distribution for sample heights with samples of size 100 is also roughly normal with mean 70 inches and standard error 0.3 inches. Recall that roughly 68% of observations in a normal distribution are within 1 standard deviation of the mean. Which of the following are true?

- (A) 68% of American men are between 67 and 73 inches tall.
- (B) 68% of simple random samples of 100 American men will have a mean height between 69.7 and 70.3 inches.
- (C) 68% of simple random samples of 100 American men will have a mean height between 67 and 73 inches.
- (D) None of the above OR more than one of the above.

5. Suppose `pnorm` is a function that takes z-scores to percentiles and `qnorm` is a function that takes percentiles to z-scores. You are interested in calculating a 99% confidence interval for a proportion, and the sampling distribution is well approximated by a normal distribution. Which of the following would you use to find z^* for your confidence interval?

- (A) `pnorm(0.99)`
- (B) `qnorm(0.99)`
- (C) `pnorm(0.995)`
- (D) None of the above

6. You want to know what percentage of books written by female authors in 2022 feature a female protagonist. You take a simple random sample of 40 books written by female authors in 2022 and compute a 95% confidence interval for the proportion of those books which feature a female protagonist. The margin of error for your confidence interval is 10%. How big a sample size would you have needed if you wanted your confidence interval to have a margin of error of 5%?

- (A) 10 books
- (B) 80 books
- (C) 160 books
- (D) None of the above