The Central Limit Theorem Quiz

1. In a recent survey, the proportion of adults who indicated mystery as their favorite type of book was 0.325. Two simulations will be conducted for the sampling distribution of a sample proportion from a population with a true proportion of 0.325. Simulation A will consist of 1,500 trials with a sample size of 100. Simulation B will consist of 2,000 trials with a sample size of 50.

Which of the following describes the center and variability of simulation A and simulation B?

(A) The centers will roughly be equal, and the variabilities will roughly be equal.

(B) The centers will roughly be equal, and the variability of simulation A will be greater than the variability of simulation B.

(C) The centers will roughly be equal, and the variability of simulation A will be less than the variability of simulation B. ✓

(D) The center of simulation A will be greater than the center of simulation B, and the variability of simulation A will roughly be equal to the variability of simulation B.

(E) The center of simulation A will be less than the center of simulation B, and the variability of simulation A will be greater than the variability of simulation B.

Answer C

Correct. The mean of a sampling distribution is equal to the mean of the population being sampled. The standard deviation for simulation A will be less than the standard deviation for simulation B because the sample size for simulation A is larger than the sample size for simulation B.

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2. A recent survey indicated that the mean time spent on a music streaming service is 210 minutes per week for the population of a certain country. A simulation was conducted to create a sampling distribution of the sample mean for a population with a mean of 210. The following histogram shows the results of the simulation.
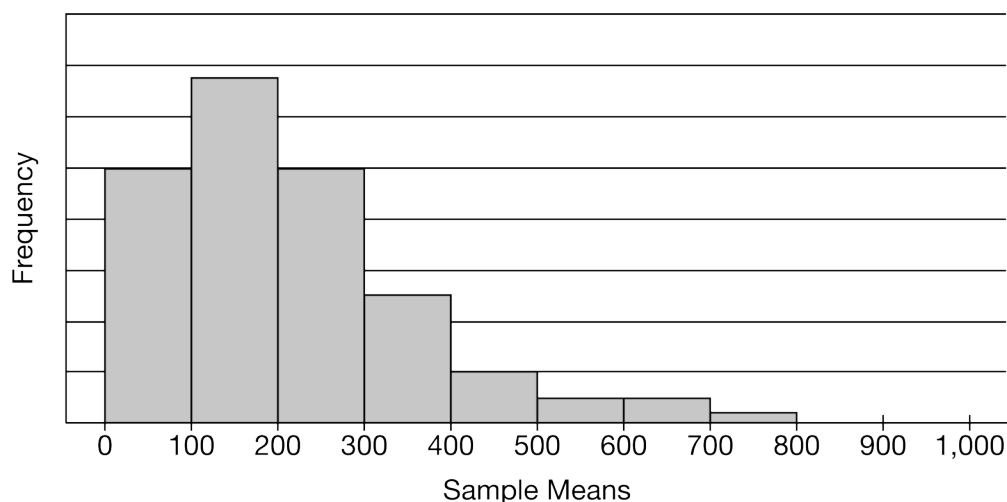
Which of the following would be the best reason why the simulation of the sampling distribution is not approximately normal?

(A) The samples were not selected at random.

(B) The sample size was not sufficiently large. ✓

(C) The population distribution was approximately normal.

(D) The samples were selected without replacement.

(E) The sample means were less than the population mean.
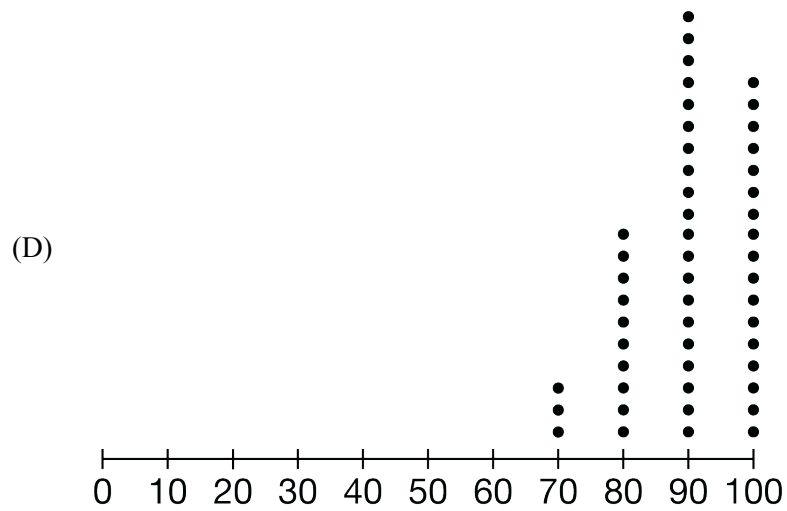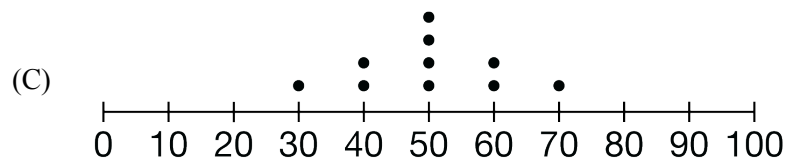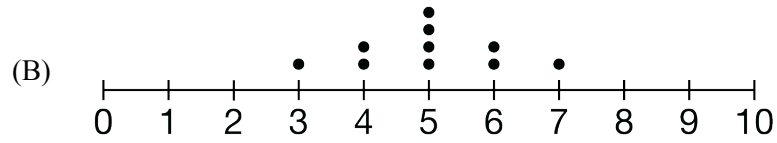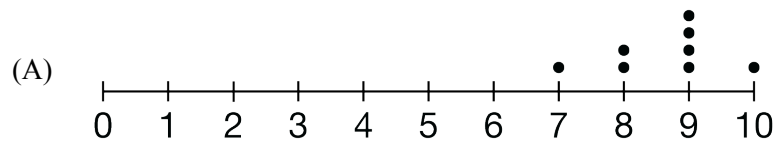
> **Answer B**
>
> Correct. Of the choices given, the best reason for the skew is that the sample size was not sufficiently large. The sampling distribution of the sample mean will be approximately normal if the sample size is large enough or if the population is approximately normal. Because this sampling distribution is skewed, it is likely that neither of those conditions exist.

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3. A recent report indicated that 90 percent of adults in a certain region actively try to include vegetables in their diet. A simulation was conducted that consisted of 50 trials with a population parameter of 0.9. Each trial consisted of a sample size of 10. The number of successes out of 10 was recorded, where success represented an adult trying to include vegetables in the diet.

Five possible simulation results are shown. Which simulation is the best match to the one described?

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(A)

(B)

(C)

(D)

(E) ✓

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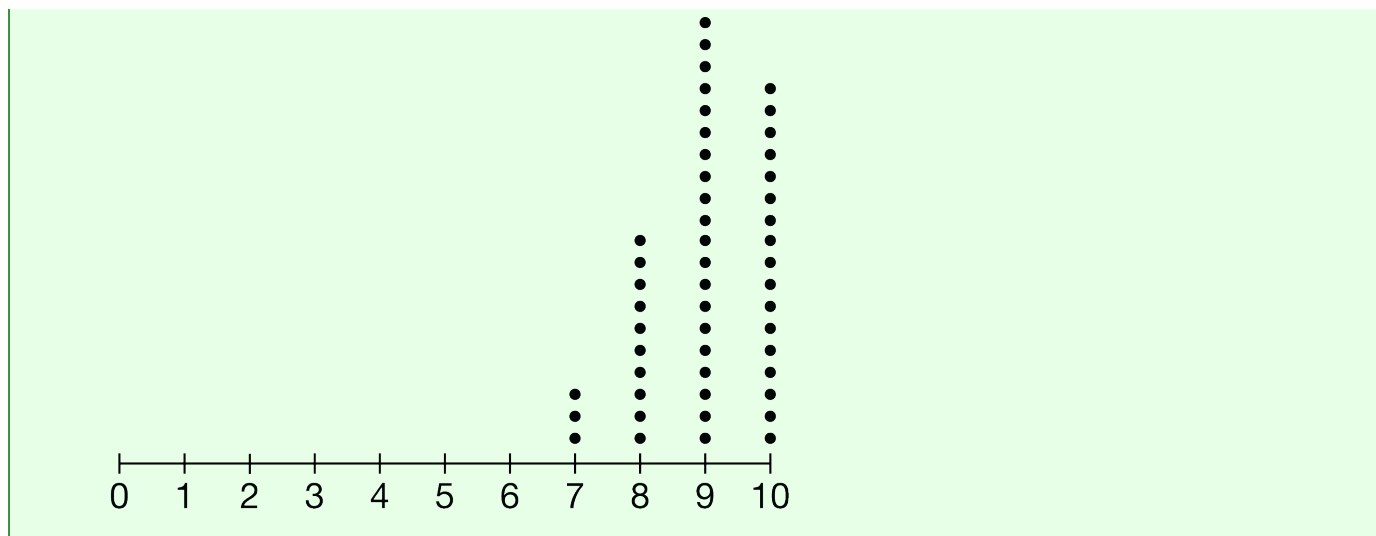
Answer E

Correct. The simulation consists of 50 trials (shown as dots on the plot), which matches the number of trials of the simulation. With a proportion of 0.9 and a sample size of 10, the distribution will be centered at 9 adults who actively try to include vegetables in their diet.