

Unit 05 Review: Sampling Distributions

Sampling Distributions and the Central Limit Theorem:

Consider taking many (theoretically, all possible) samples of size n from a population. Take the average \bar{x} of each sample. All of these sample means make up the sampling distribution, which can be graphed as a histogram.

- The mean of the sampling distribution is the same as the mean of the population from which we took all of our samples: $\mu_{\bar{x}} = \mu$
- The standard deviation of the sampling distribution gets smaller according to this equation: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$
- The Central Limit Theorem states that as the sample size n increases, the sampling distribution becomes more Normal (regardless of the shape of the population). In practice, if n is at least 30, we assume the sampling distribution is approximately Normal.

Multiple Choice:

1. The distance Jonathan can throw a shot put is skewed to the right with a mean of 14.2 meters and a standard deviation of 3.5 meters. Over the course of a month, Jonathan makes 75 throws during practice. Assume these throws can be considered a random sample of Jonathan's shot put throws. What is the probability that Jonathan's average shot put distance for the month will be over 15.0 meters?
 - a. 0.0239
 - b. 0.4096
 - c. 0.5224
 - d. 0.5904
 - e. 0.9761

2. Heights of fourth graders are Normally distributed with a mean of 52 inches and a standard deviation of 3.5 inches. For a research project, you plan to measure a simple random sample of 30 fourth graders. For samples such as yours, 10% of the samples should have an average height below what number?
 - a. 47.52 inches
 - b. 51.18 inches
 - c. 51.85 inches
 - d. 52.82 inches
 - e. 56.48 inches

c. What is the probability that the average IQ score on this test of an SRS of 60 people is 105 or higher?

d. Would your *method* of answering (a) or (c) be affected if the distributions of IQ scores on this test in the adult population were distinctly non-Normal (for example, if they were skewed)? Explain which parts could be answered the same way, which could not, and how do you know.