Making Inferences

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Introduction

- Basis for many statistical tests
- Important concept in inferential statistics

Making Inferences

For observations:

\[ Z = \frac{(x - \mu)}{\sigma} \]

For sample means:

\[ Z = \frac{(\bar{x} - \mu)}{\sigma / \sqrt{n}} \]

\( s \) = Standard Deviation of the Sample
\( \bar{x} \) = Mean of the Sample
\( \mu \) = True Mean
**Applying the Concept**

Population
- Population mean ($\mu$) = 100
- Population standard deviation ($\sigma$) = 21

Sample
- Sample size (n) = 49

What is the probability that the mean blood pressure of a random sample of students will be greater than 1057?

- Use the Z-score formula:
  \[ Z = \frac{X - \mu}{\sigma/\sqrt{n}} \]
- Calculate
  \[ Z = \frac{1057 - 1000}{21/\sqrt{49}} = \frac{57}{3} = 1.9 \]
- Probability from Normal Curve Table (column 3) = .025

**Effect of Sample Size**

- For a fixed population standard deviation, the standard error of mean decreases as sample size increases.

\[ \sigma_s = \frac{\sigma}{\sqrt{n}} \]

- As sample size increases, the standard error decreases, which in turn decreases the area under the curve.

Sample 1:
- n = 49
- $\sigma_s = \frac{21}{\sqrt{49}} = 3$
- Area = .0475

Sample 2:
- n = 100
- $\sigma_s = \frac{21}{\sqrt{100}} = 2.1$
- Area = .0087