Chapter 7

Inferences Based on a Single Sample: Estimation with Confidence Intervals

Determining the Sample Size

When we want to estimate μ to within x units with a (1-α) level of confidence, we can calculate the sample size needed

We use the Sampling Error (SE), which is half the width of the confidence interval

To estimate μ with Sampling error SE and 100(1-α)% confidence,

$$n = \frac{(z_{\alpha/2})^2 \sigma^2}{(SE)^2}$$

where σ is estimated by s or R/4

2

Determining the Sample Size

Assume a sample with α=.01, and a standard deviation of .1. What size sample do we need to achieve a desired SE of .025?

$$n = \frac{(z_{\alpha/2})^2 \sigma^2}{(SE)^2} = \frac{(2.575)^2 (.1)^2}{(.025)^2} = 106.09$$

3

Determining the Sample Size

Sample size can also be estimated for population proportion p

$$n = \frac{(z_{\alpha/2})^2 (pq)}{(SE)^2}$$

Since pq is unknown you must estimate. Estimates with a value of p being equal or close to .5 are the most conservative

4