Ch 6.4 Finding the sample size Sample Size for Estimating Mean μ $E = Z_{\alpha/2} \bullet \frac{\sigma}{\sqrt{\mu}}$ (solve for n by algebra) $n = \left[\frac{Z_{\alpha/2}\sigma}{E}\right]^2$ Formula 6-3 $z_{\alpha/2} = \text{critical } z \text{ score based on the desired degree of confidence}$ E = desired margin of error $\sigma = \text{population standard deviation}$

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Round-Off Rule for Sample Size n

When finding the sample size n, if the use of Formula 6-3 does not result in a whole number, always *increase* the value of n to the next *larger* whole number.

n = 216.09 = 217 (rounded up)

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Ex1b). Scores on a certain test are normally distributed with a *variance* of 15. A researcher wishes to estimate the mean score achieved by all students on the test. Find the sample size needed to assure 98% confidence that the sample mean will not differ from the population mean by more than 4 units.

$$Z_{\alpha/2} = E = \sigma =$$

$$n = \left[\frac{\mathsf{z}_{\alpha/2} \, \mathsf{\sigma}}{\mathsf{E}}\right]$$

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Try)You want to find the mean IQ scores of a statistics professor. If you want to be 95% confident and have an error of 2 points of the true population mean and a standard deviation of 15, how many professors would you have to survey?

$$Z_{\alpha/2} = E = \sigma =$$

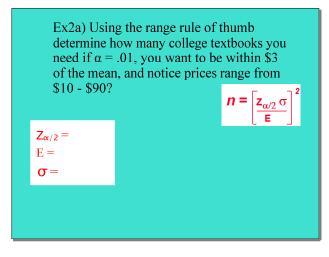
$$\boldsymbol{n} = \left[\frac{\mathbf{z}_{\alpha/2} \, \sigma}{\mathsf{E}} \right]^2$$

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What if σ is Not Known?

- 1. Use the range rule of thumb to estimate the standard deviation as follows: $\sigma \approx \frac{\text{range}}{4}$
- Conduct a pilot study by starting the sampling process. Based on the first collection of at least 31 randomly selected sample values, calculate the sample standard deviation s and use it in place of σ. That value can be refined as more sample data are obtained.
- 3. Estimate the value of σ by using the results of some other study that was done earlier.
- $\begin{tabular}{ll} & Larger errors allow smaller samples. \\ \end{tabular}$
- $\begin{tabular}{l} & Smaller errors require larger samples. \end{tabular}$

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