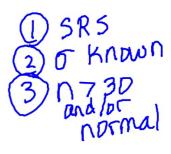
Section 6.3

6.3 Estimating a Population Mean
In order to estimate the population mean
the following <u>assumptions</u> must be true:

- 1) The sample is a simple random sample.
- 2) The value of the population std dev 5 is known.
- 3) The population is normally distributed and/or n>30 (the sample size is greater than 30).

**It doesn't make sense that we'd know the std dev but not the mean b/c you find the std dev based on the mean. But, we are going to find the mean to help us develop other skills.



The sample mean \overline{x} is the best point estimate of the population mean.

Just as the population proportion p, has confidence intervals and a margin of error, so does the population mean .

7: mean of sample

Definition

Margin of Error

based on known std dev 🝼

Round E to nearest hundreth

$$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

$$z_{-E} < \mu < z_{+E}$$

Confidence Interval (or Interval Estimate) for Population Mean Mean when 5 is known

$$\frac{\overline{x} - E < \mu < \overline{x} + E}{\overline{x} \pm E}$$
or
$$(\overline{x} - E, \overline{x} + E)$$
confidence interval limits

For a simple random sample,
$$n = 210$$
 $\overline{x} = 35$ and $\sigma = 1.2$

Using a .95 confidence level, find

- a) the margin of error E
- b) the confidence interval for

a.)
$$E = Z_{2/2} \cdot \frac{6}{10}$$
 b.) $34.84 \le \mu < 35.16$
= $1.96 \cdot \frac{1.2}{\sqrt{210}}$
 $E = .16$

heights of woman X = 64.7 C = 2.5 N = 142 94% confidence population $E = Z_{3/2}$ N = 142 St. dev. $E = 1.88 \cdot \frac{2.5}{\sqrt{142}}$ E = 39 64.7 $\sqrt{142}$ $\sqrt{142}$

is between <u>64.31</u> and <u>65.09</u>

Determining the Sample Size for Estimating Mean μ

$$n = \left[\frac{(z_{\alpha/2}) \cdot \sigma}{E}\right]^{2}$$
 Formula 6-5

If n is not a whole number, round n up to the next larger whole number.

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Use the given margin of error, confidence level, and population std dev to find the minimum sample size required to estimate an unknown population mean.

Margin of error: \$2.50;

confidence level: 98%;