7.2 Mean and Standard Dev of Sample Mean

GOALS:
1. Understand how the sample mean relates to the population mean.
2. Understand how the sample standard deviation relates to the population standard deviation.
3. Define the standard deviation of all the sample means as the STANDARD ERROR.

Study Ch. 7.2, # ~41, 47, 49

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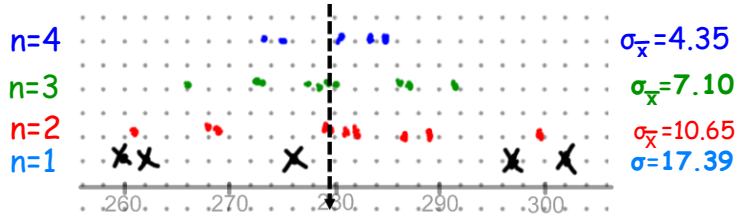
7.2 Mean and Standard Dev of Sample Mean



Mean of the Sample Mean

$$\mu_{\bar{x}} = \mu$$

How does the Standard Deviation of the Sample Mean relate to the population standard dev.?

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

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7.2 Mean and Standard Dev of Sample Mean

Sampling without Replacement

$$\sigma_{\bar{x}} = \sqrt{\frac{N-n}{N-1}}\frac{\sigma}{\sqrt{n}}$$

Sampling with Replacement

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

If n is small relative to N ($n \leq 0.05N$) then there is little difference between with and without replacement. So use simpler formula.

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7.2 Mean and Standard Dev of Sample Mean

Mean of the Sample Mean

$$\mu_{\bar{x}} = \mu$$

Standard Deviation of the Sample Mean

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Standard Error (of the Mean)

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7.2 Mean and Standard Dev of Sample Mean

G: mean age of self-employed in the U.S. is 46.6 yrs, the stdev is 10.8 yrs

F: a) identify the population the variable

b) n = 100, F: mean, stdev of $\bar{x}$

c) repeat, n=175

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a) Population: self-employed in US; variable: age

b) $\mu_{\bar{x}} = \mu = 46.6$ yrs, $n = 100$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10.8}{\sqrt{100}} = 1.08$ yrs

c) $n = 175$

$\mu_{\bar{x}} = \mu = 46.6$ yrs

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10.8}{\sqrt{175}} = \frac{10.8}{13.229} = 0.816$

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