10% condition: close to independent

$3/8 = .38$
$2/7 = .29$ $> .09$

$3/800 = .004 > .001$
$2/799 = .003$

Large counts condition: approximately normal

$\hat{p}$: $np \geq 10$ and $n(1-p) \geq 10$

$\bar{x}$: $n \geq 30$

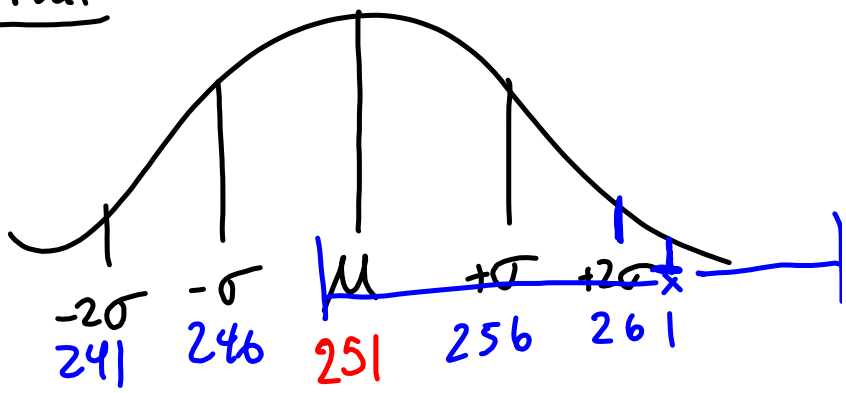
8.1 Confidence interval

~~0 1000~~

~~200 280~~

~~241 291~~

$\sigma_{\bar{x}} = \frac{20}{\sqrt{16}} = 5$



A point estimator is a statistic that provides an estimate of a population parameter. The value of the statistic is called the point estimate.

Ex: In the mystery mean activity, $\bar{x}$ was our point estimator, 251 was the point estimate.

Ex: The math dept. wants to find the proportion of students who own a graphing calculator. They take a sample of 96 students and find 41 own a graphing calculator. Determine the point estimator and the pt. estimate.

point estimator: $\hat{p}$, sample proportion

point estimate: $\frac{41}{96} = .427$

A C% Confidence Interval (CI) gives an interval of plausable values for the parameter, and is calculated to be point estimate ± margin of error

Ex: 251 ± 10 C% = 95%

241 to 261

The difference between the point estimate and true parameter will be less than the margin of error in C% of samples.

The confidence level, C, gives the overall success rate of the method for calculating the confidence interval. That is, in C% of all possible samples, the method would yield an interval that "captures" the true parameter.

Interpreting a CI

To interpret a C% CI for an unknown parameter, say:

"We are C% confident that the interval from ___ to ___ capture the (parameter of interest)"

From the mystery mean example, we would say:
"We are 95% confident that the interval 241 to 261 captures the population mean"

- 95% confident means that if we take many samples of size n from a population, 95% of them will result in an interval the captures the parameter value.

- Since we will typically only construct 1 CI, we need to remember that the CI does not tell us the chance that a particular CI captures the population parameter, rather it tells us plausable value.

Check your understanding p. 485

Construction of a CI

The confidence interval for estimating a population parameter has the form:

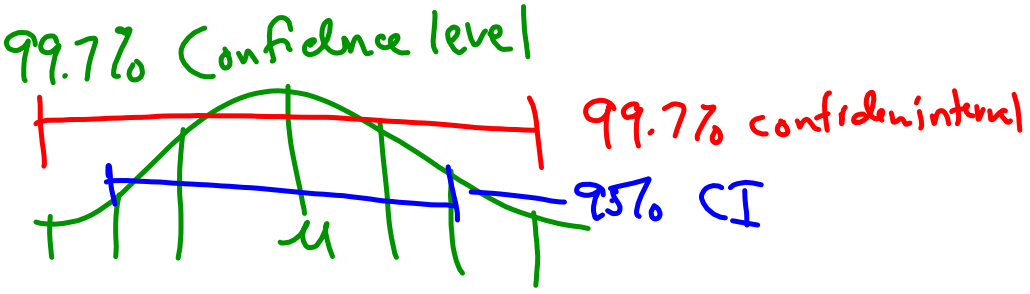
$$\text{Statistic} \pm \underbrace{\text{critical value} \cdot \text{standard deviation of the statistic}}_{\text{margin of error}}$$

where the statistic is the point estimator of the parameter

Ideally we want high confidence and a small margin.

To reduce the margin of error:

1. increase sample size n
2. decrease confidence level, C



Other things to keep in mind about CI's:

(1) our method for calculation uses SRS's

(2) The margin of error in a CI only covers chance variation due to random sampling or random assignment