8.1a Confidence Intervals

(use a statistic to estimate a parameter)

Ex: Suppose we take an SRS of 50 U of U freshmen $\bar{x} = 112$
and give them an IQ test. Their mean score is 112.
What can we say about the mean score of ALL
U of U freshmen?

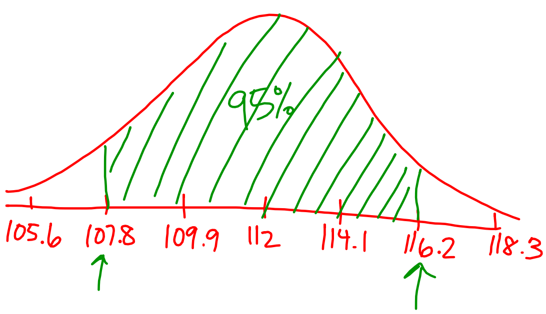
point estimate = 112

Look at the Sampling Distribution. $\sigma = 15$
Suppose we know the IQ scores have a st. dev. of 15.

$\mu_{\bar{x}} = 112$

$\sigma_{\bar{x}} = \frac{15}{\sqrt{50}} = 2.1$ more than 500 U of U freshmen 10% rule is met.

Normal? yes. CLT says 50>30 it will be normal.



In 95% of samples, $\bar{x}$ will be within 2σ of μ

Estimate that the true mean is somewhere between $\underbrace{112 - 2(2.1)}_{107.8}$ and $\underbrace{112 + 2(2.1)}_{116.2}$

(interval estimate)

Write interval as: $112 \pm \underbrace{2(2.1)}_{\text{margin of error}}$

107.8 to 116.2

$107.8 < \mu < 116.2$

$(107.8, 116.2)$

95% = Confidence Level (C)

Interpreting Confidence Level

"____ % of all possible samples of size ____ from
c n
the population will result in an interval that
captures the true __________."
parameter in context

Interpreting Confidence Interval

"I am ____ % confident that the interval
c
from ____ to ____ captures the true
interval
__________."
parameter in context

Form of a Confidence Interval

Statistic $\pm$ $\underbrace{\text{critical value} \cdot \text{st. dev. of statistic}}_{\text{margin of error}}$

depends on C-level

depends on sample size