Basic Statistics Final Exam Review

What You'll Need to Know

- Rules of probability
- "and" vs. "or" probability
- Variable types
- Difference between a sample and a population
- Sampling
- Confidence intervals
- z-scores
- Using the normal probability applet
- Hypothesis testing
- Data types for graphs

Tips

- Use your notes, the content, a buddy...
- Write down your answers just in case your internet flops
- Take your time

Rules of Probability

The Rules!

- All probabilities are between 0 and 1
- There are no negative probabilities
- Total of all possible outcomes is 1
- Probability of an event NOT happening:
  - 1 – probability of the event happening

Variable Types

Quantitative / Numeric

- Number

- Continuous: With decimal places
- Discrete: Whole number

Qualitative

- NOT a number
- Words

- Categorical: Broken into groups
- Ordinal: Broken into groups where ORDER MATTERS

Samples and Populations

Samples vs. Populations

Population

- Larger
- Use Greek letters
  - Mean: μ (mu)
  - Standard deviation: σ (sigma)

Sample

- Smaller
- Use Roman letters
  - $\bar{x}$ (x bar)
  - S / SD

Parent vs. Child Distributions

Parent

- Larger SD
- Population

Child

- Smaller SD
- Same mean as the parent
- Sample

Standard Deviation of the Child (Sample)

- **What is the standard deviation of the sample if the sigma is 12 and your n is 444?**

$$stdev\ of\ child\ distribution = \frac{stdev\ of\ parent\ distribution}{\sqrt{sample\ size}}$$

$$\frac{12}{\sqrt{444}} \qquad \frac{12}{21.07} \qquad .57$$

Confidence Intervals

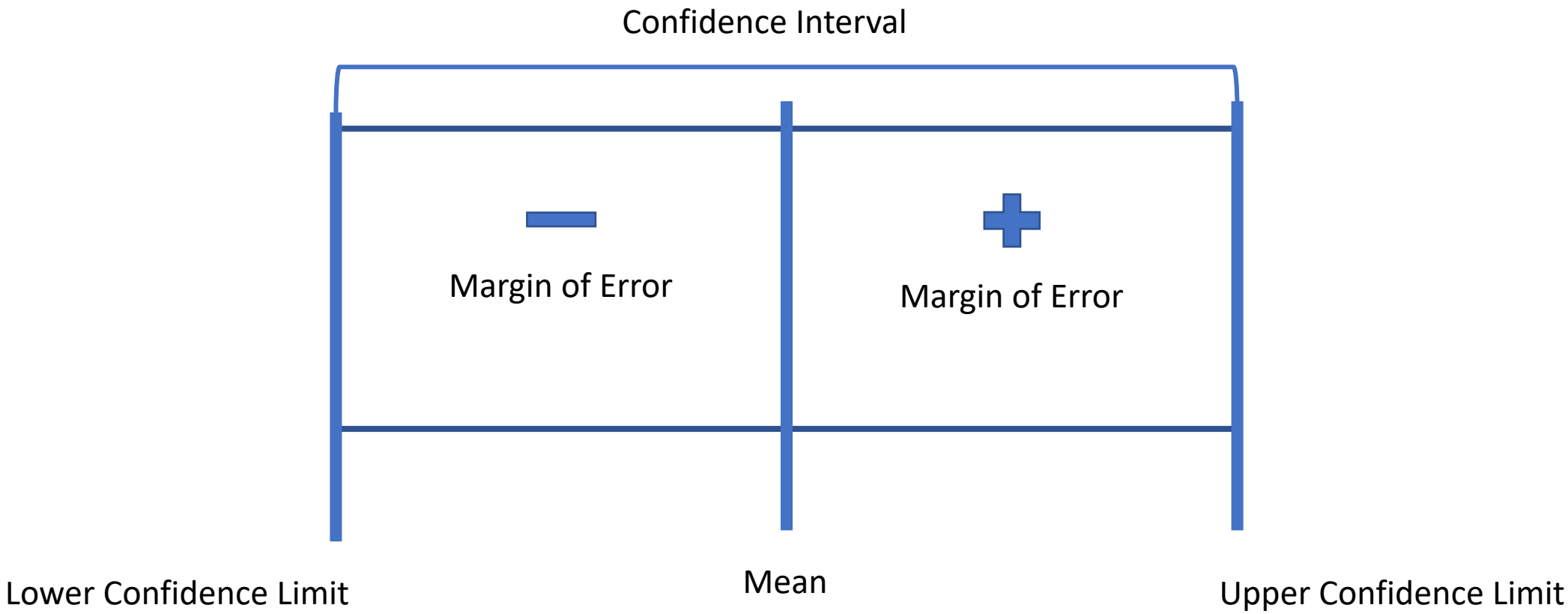
What is a Confidence Interval?

- Band around the mean
- Your true mean falls somewhere in there
  - 90% CI: 90% of the time
  - 95% CI: 95% of the time
  - 99% CI: 99% of the time

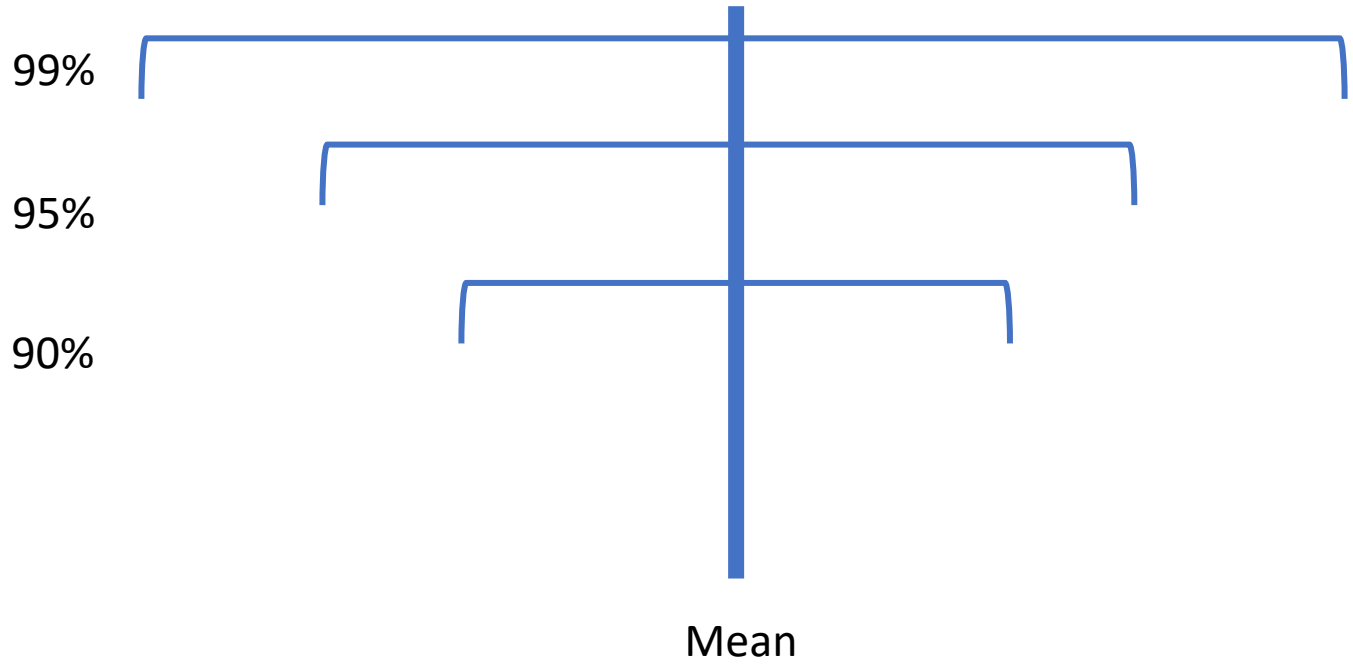
What is Margin of Error?

- Amount you could be wrong by
- Gets added and subtracted from the mean

Putting it All Together



The Larger the Interval, the More Certain



z-scores

The Formula

$$z = \frac{x - \mu}{\sigma}$$

An Example Working Backwards

- x = 30
- mu = 25
- z = 3.2

- What is sigma?

$$z = \frac{x - \mu}{\sigma} \qquad 3.2 = \frac{30 - 25}{\sigma} \qquad 3.2\sigma = \frac{30 - 25 \ * \sigma}{\sigma} \qquad \frac{3.2\sigma}{3.2} = \frac{30 - 25}{3.2} \qquad \sigma = \frac{5}{3.2} \qquad \sigma = 1.56$$

Using the Normal Probability Applet

An Example

- What is the probability of selecting a value that is either smaller than 12 or greater than 18, for a distribution with a mean of 15 and a standard deviation of 2?

- .13, or 13%

- http://davidmlane.com/hyperstat/z_table.html

Data Types for Graphs

Categorical Only

- Pie
- Bar
- Pareto

Continuous Only

- Histogram
- Boxplot
- Scatterplot
- Line graph

Mixed: Categorical + Continuous

- Histogram with multiple groups
- Side-by-side boxplots
- Stacked bar graph
- Data map
- Tree map
- Heat map

Questions?