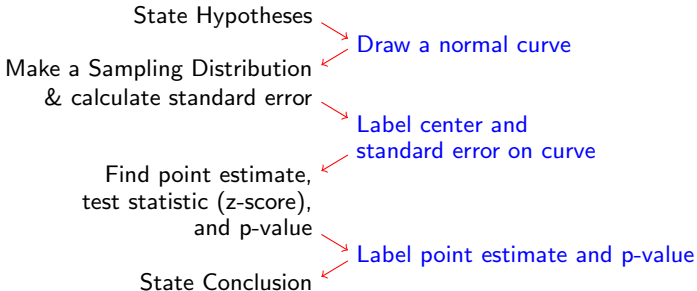# Introductory Statistics – Day 19

1 Proportion Hypothesis Tests and
Confidence Intervals

Hypothesis Testing

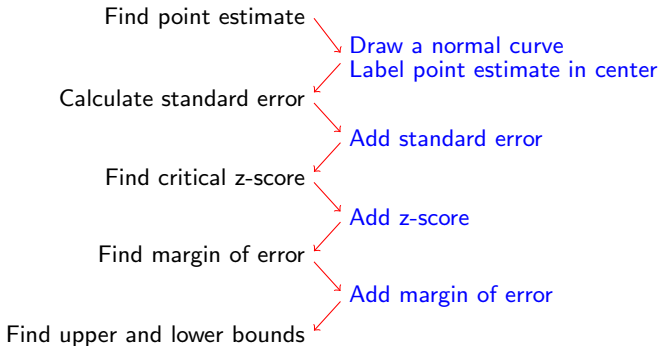State Hypotheses

Make a Sampling Distribution
& calculate standard error

Find point estimate,
test statistic (z-score),
and p-value

State Conclusion

Draw a normal curve

Label center and
standard error on curve

Label point estimate and p-value

Finding Confidence Intervals

Find point estimate

Draw a normal curve
Label point estimate in center

Calculate standard error

Add standard error

Find critical z-score

Add z-score

Find margin of error

Add margin of error

Find upper and lower bounds

To construct a 95% confidence interval

95% CI:	point estimate $\pm 1.96 \times SE$
90% CI:	point estimate $\pm 1.64 \times SE$
99% CI:	point estimate $\pm 2.58 \times SE$
α-CI:	point estimate $\pm z_\alpha \times SE$

- z_α is called the critical z-score for the given α-value.
- the second half of the above expression, $z_\alpha \times SE$, is called the **margin of error** or MOE.

Warm Up:

The average height of an 8 year old is 54 inches with a standard deviation of 2.5 inches. Let's assume this population is normally distributed. Sketch a labeled normal distribution, being careful to label your bottom axis with reasonable measurements.

If an 8 year old is randomly selected, what's the chance they are over 55.5 inches?

Mark this on your sketch and find the probability using Excel.

Activity 1:
According to the CDC, "Approximately 10% of women reported smoking during the last 3 months of pregnancy."

A local non-profit is concerned that the NC numbers are higher than the national average of 10%. Is there sufficient evidence to support this concern?

Activity 2:
Is smoking less common among pregnant women in NC than the general population of women? Nationally, about 13% of women smoke.

Activity 3: For each of the following, conduct a hypothesis test using a real world data set. Then follow-up with a confidence interval if appropriate. Using the NCBabySmoke data from North Carolina (adapted from OpenIntro Stats), conduct a hypothesis test for each of the following. Then follow-up with a 95% confidence interval if appropriate.

Are premies 50% girls and 50% boys, or are premie boys more common (in NC)? Note: For this question, you will have considerably less than 1000 babies. Use a pivot table to get a count of premies vs. full term babies, and to sort boys and girls.