

# CI and HT for differences via CLT

## Difference in proportions

A survey asked 827 randomly sampled registered voters in California: Do you support or oppose drilling for oil and natural gas off the Coast of California? We have the following distribution of responses separated by whether the respondent graduated from college:

position	no	yes	total
oppose	126	180	306
support	132	154	286
total	258	334	592

## Confidence interval

Let population 1 be college attendees, and population 2 be non-college attendees. We want a 95% CI for  $p_1 - p_2$ , where  $p_i$  is the proportion of population  $i$  who support offshore drilling.

- Obtain useful statistics:

- Check conditions for CLT:

- Are conditions for CLT met?

- Collect the components of confidence interval:

- Construct interval:

- Interpret:

### **Hypothesis test**

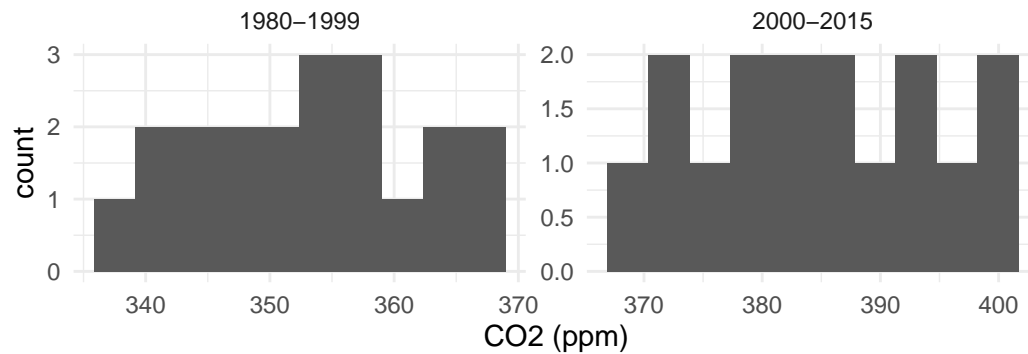
Do the data provide strong evidence at the 0.05 level that the proportion of college graduates who support off-shore drilling in California is different than that of non-college graduates?

- Define hypotheses
- Obtain pooled proportion

- Check conditions for CLT
- Are conditions for CLT met?
- What is the null distribution of  $\hat{p}_1 - \hat{p}_2$ ?
- Find the value of the test-statistic
- Draw picture and write code to obtain p-value

## Difference in means

The Mauna Loa Observatory in Hawaii monitors atmospheric solar, atmospheric, and meteorological parameters. We have data on annual atmospheric CO<sub>2</sub> concentrations from 1980-2015. Specifically, we are interested in comparing CO<sub>2</sub> levels between years 2000-2015 and years 1980-1999.



group	n	xbar	s
1980-1999	20	353.12	9.0
2000-2015	16	385.02	9.9

## Confidence interval

Obtain a 90% confidence interval for the difference between the average atmospheric CO<sub>2</sub> levels (ppm) from years 2000-2015 and years 1980-1999.

- Define parameters
- Check conditions for CLT
- Are conditions for CLT met?

- Collect the components of confidence interval:

- Construct interval:

- Interpret:

### **Hypothesis test**

- Define hypotheses
- We already checked conditions!
- Find the value of the test-statistic and its distribution
- Draw picture and write code to obtain p-value