Chapter Project

Pales in Comparison

Part 1

Different types of beers have different ingredients, flavors, and alcohol amounts. Two popular beers in the US are the American Pale Ale and the American IPA. The IPAs tend to have a stronger flavor and come in a variety of colors whereas the Pale Ales tend to be lighter in flavor and in color. Using a statistical package, test to determine if the mean alcohol by volume for the American IPA is the same as the mean alcohol by volume for the American Pale Ale.

Data

The data can be found at stat.hawkeslearning.com **Data Sets > Beers and Breweries.**

1. Graph the alcohol volumes for the two types of beers using appropriate graphs and calculate statistics appropriate for this type of data.
2. Conduct the appropriate hypothesis test using the following steps.
   a. Determine the null and alternative hypotheses.
   b. Use a significance level of $\alpha = 0.05$.
   c. Validate the assumptions of the hypothesis test, identify the appropriate test statistic, and compute its value. Using the graphs created, determine if you should be conducting a two-sample test of the mean with equal or unequal variances.
   d. Determine the *P*-value.
   e. Make a decision to reject or fail to reject the null hypothesis, H_0.
   f. State the conclusion in terms of the original question.
3. Calculate the 95% confidence interval for the difference between the two means. Does this confidence interval support your results from the hypothesis test? Why or why not?

Part 2

Colorado and California are huge producers of beers with many microbreweries in each state. Both states produce a variety of different types of beers as well. Is the proportion of American IPA's compared to all other types of beers the same in both California and Colorado?

1. Graph the American IPAs as compared to all other types of beer for each state using appropriate graphs and calculate statistics appropriate for this type of data.
2. Conduct the appropriate hypothesis test using the following steps.
   a. Determine the null and alternative hypotheses.
   b. Use a significance level of $\alpha = 0.05$.
   c. Validate the assumptions of the hypothesis test, identify the appropriate test statistic, and compute its value.
   d. Determine the *P*-value.
   e. Make a decision to reject or fail to reject the null hypothesis, H_0.
   f. State the conclusion in terms of the original question.
3. Calculate the 95% confidence interval for the difference between the two proportions. Does this confidence interval support your results from the hypothesis test? Why or why not?