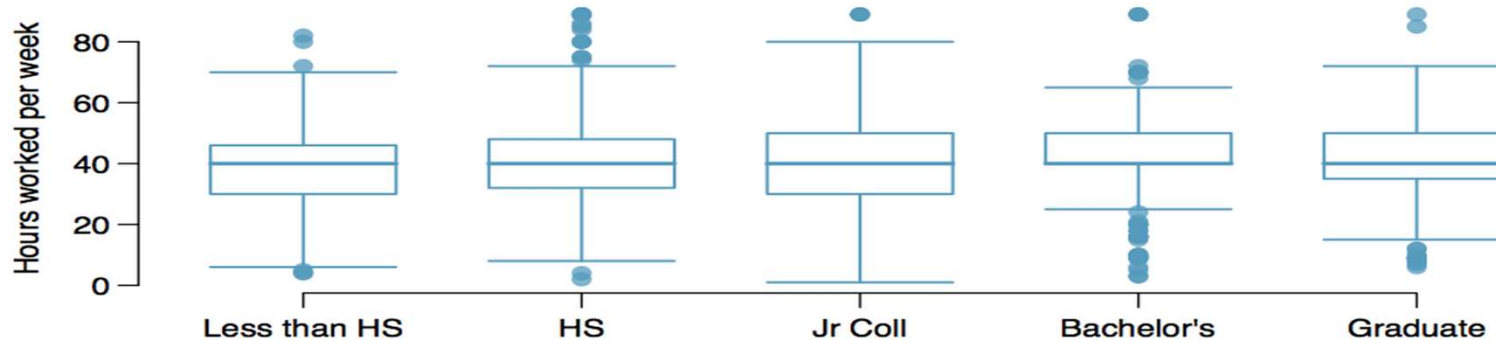


Midterm 2 Review - Labs

5.48 Work hours and education. The General Social Survey collects data on demographics, education, and work, among many other characteristics of US residents.⁴⁷ Using ANOVA, we can consider educational attainment levels for all 1,172 respondents at once. Below are the distributions of hours worked by educational attainment and relevant summary statistics that will be helpful in carrying out this analysis.

	<i>Educational attainment</i>					Total
	Less than HS	HS	Jr Coll	Bachelor's	Graduate	
Mean	38.67	39.6	41.39	42.55	40.85	40.45
SD	15.81	14.97	18.1	13.62	15.51	15.17
n	121	546	97	253	155	1,172



- Write hypotheses for evaluating whether the average number of hours worked varies across the five groups.
- Check conditions and describe any assumptions you must make to proceed with the test.
- Below is part of the output associated with this test. Fill in the empty cells.

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
degree	<input type="text"/>	<input type="text"/>	501.54	<input type="text"/>	0.0682
Residuals	<input type="text"/>	267,382	<input type="text"/>		
Total	<input type="text"/>	<input type="text"/>			

- What is the conclusion of the test?

Inference for a Single Proportion

A 2012 survey of 2,254 American adults indicates that 17% of cell phone owners do their browsing on their phone rather than a computer or other device.

- (a) According to an online article, a report from a mobile research company indicates that 38 percent of Chinese mobile web users only access the internet through their cell phones. Conduct a hypothesis test to determine if these data provide strong evidence that the proportion of Americans who only use their cell phones to access the internet is different than the Chinese proportion of 38%.
- (b) Interpret the p-value in this context.
- (c) Calculate a 95% confidence interval for the proportion of Americans who access the internet on their cell phones, and interpret the interval in this context.

Chi-Square Test

Rock-paper-scissors is a hand game played by two or more people where players choose to sign either rock, paper, or scissors with their hands. For your statistics class project, you want to evaluate whether players choose between these three options randomly, or if certain options are favored above others. You ask two friends to play rock-paper-scissors and count the times each option is played. The following table summarizes the data:

Rock	Paper	Scissors
43	21	35

Use these data to evaluate whether players choose between these three options randomly, or if certain options are favored above others. Make sure to clearly outline each step of your analysis, and interpret your results in context of the data and the research question.

Hypothesis Test

The nutrition label on a bag of potato chips says that a one ounce (28 gram) serving of potato chips has 130 calories and contains ten grams of fat, with three grams of saturated fat. A random sample of 35 bags yielded a sample mean of 134 calories with a standard deviation of 17 calories. Is there evidence that the nutrition label does not provide an accurate measure of calories in the bags of potato chips? We have verified the independence, sample size, and skew conditions are satisfied.

Power: Application exercise

In a study of the periodical cicada (*Magicicada septendecim*), researchers measured the hind tibia lengths of the shed skins of 110 individuals. Results for males and females are shown in the accompanying table.

GROUP	TIBIA LENGTH (μm)		
	<i>n</i>	MEAN	SD
Males	60	78.42	2.87
Females	50	80.44	3.52

We want to test to see if there is an increase in the average tibia length of female compared to male cicadas. Calculate the power of the test to detect an increase of 2 μm .