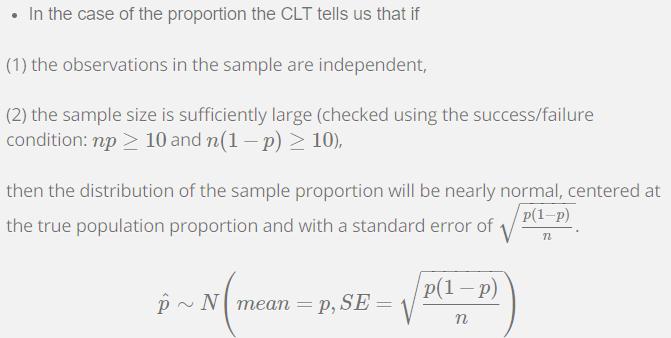
***Week 4 Quiz***

* Suppose you want to construct a CI for a population *proportion*. Which of the following, if it were true, would prevent you from being able to assume the distribution of the sample proportion is nearly normal w/ n = 104?
* ~~These observations are a simple random sample and make up less than 10% of the population.~~
* **Out of these 104 there are only a few failures (7), but relatively many successes (97).**



* In 2013, Edward Snowden leaked details of top-secret NSA spying activities to the media. A poll conducted by USA TODAY/Pew Research Center asked 1,504 people in U.S. whether Snowden’s leaks have helped or harmed the public interest. 53% of respondents answered “helped”. You want to test whether a majority of people in the U.S. believe he helped the public interest. Which of the following is the correct set of hypotheses?
* **H0: ρ=0.5; HA: ρ>0.5**
* In response to complaints from residents about too many (~15%) of the cars passing by the local school speeding, police started closely monitoring traffic. You want to check if police efforts had an effect on prevalence of speeding in this area. 1 day you observe 560 different cars pass by the school + find 70 of them speeding. You calculate a p-value of 0.0976. Assuming the cars are representative of all cars that drive by the school, which of the following is true?
* **If in fact the police’s efforts didn’t have an effect, the probability of getting a random sample of 560 cars where 70 or less or 98 or more cars are speeding is 0.0976.**
* p-value = P(observed or more extreme test statistic | H0 true)
* observed = 98, more extreme test statistics = 70
* When do we use the pooled proportion in calculation of the SE of the difference of 2 proportions?
* **When comparing p1 + p2 using a theoretical approach, + the null H0 = p1 − p2 = 0**
* Rock-paper-scissors is a hand game played by 2+ people where players choose to sign either ‘rock’, ‘paper’, or ‘scissors’ w/ their hands. We’d like to test if players choose between these 3 options randomly, or if certain options are favored above others. What hypothesis test should we conduct to answer this research question?
* **Chi square test of goodness of fit**
* evaluate if distribution of levels of a single categorical variable follow hypothesized distribution
* When doing a hypothesis test on a single proportion (i.e. for 1 categorical variable), we studied how to calculate the p-value for the hypothesis test, beginning w/ generating simulated samples. Which of the following is the best description for how you should generate simulated samples, and why?
* **Generate simulated samples based on the null b/c we need to see how extreme observed data looks if the null were really true.**
* generate simulated samples based on the null + then calculate the # of samples that are at least as extreme as the observed data.
* T/F: In calculation of required sample size for a given margin of error of the CI for a population proportion, we should use p^ = 0.5 if we don’t have any knowledge about the characteristics of the population.
* **True**
* Suppose in a population, 20% of people wear contact lenses. What is the expected shape of the sampling distribution of proportion of contact lens wearers in random samples of 1000 people from this population?
* **nearly normal**
* If the CLT doesn't apply + sample proportion is low (close to 0) the sampling distribution will likely be right=skewed + vice versa
* Here 🡺 random sample + 20%\*1000 = 50, so CLT applies

* T/F: When success-failure condition is not met, we should use a T test to compare 2 proportions.
* **False**
* Use simulation methods when sample size conditions aren't met for inference for categorical variables.
* When sample size isn't sufficiently large + parameter of interest = proportion/difference between 2 proportions, use simulation.
* *t*-distribution = only appropriate to for *means*.
* In hypothesis testing
* 1 categorical variable = generate simulated samples based on the null + then calculate # of samples that are at least as extreme as the observed data.
* 2 categorical variables = use a randomization test.
* Suppose you want to construct a confidence interval for a population proportion. Which of the following, if it were true, would prevent you from being able to assume that the distribution of the sample proportion is nearly normal?
* n = 104. These observations are a simple random sample and make up less than 10% of the population.
* None of these options.
* n = 104. Out of these 104 there are only a few successes (15), but relatively many failures (89).
* n = 104. Out of these 104 there are an equal number of successes and failures (52 each).
* 1
* point
* 2.
* When performing a hypothesis test on proportions (either where H0:p=p0 or where H0:p1=p2) you should use the observed number of successes and failures when checking conditions.
* True
* False
* Depends on the context
* Observed proportion for one sample, expected proportion for two samples.
* 1
* point
* 3.
* You are tasked with conducting a hypothesis test evaluating whether a majority or minority of Americans think it was a bad decision to hold the 2014 winter games in Russia. You’re going to use data from a 2014 Pew Research poll asked 1,003 Americans this question, and 44% responded yes. Which of the following is the correct set of hypotheses?
* H0 :p = 0.44; HA :p ≠ 0.44
* H0 :p = 0.5; HA :p < 0.5
* H0 :p = 0.50; HA :p ≠ 0.44
* H0 :p = 0.5; HA :p ≠ 0.5
* 1
* point
* 4.
* The campaign manager for a congressional candidate claims that the candidate has more than 50% support from the district’s electorate. A newspaper collects a simple random sample of 500 likely voters in this district and estimates the support for this candidate to be 52%. The p-value for the hypothesis test evaluating the campaign manager’s claim is 0.19. Which of the below is correct?
* The success-failure condition is not met, so this p-value is not reliable.
* 95% of random samples of size 500 will estimate the support for this candidate to be 52%.
* If in fact 50% of likely voters support this candidate, the probability of obtaining a random sample of 500 likely voters where 52% or more support the candidate is 0.19.
* The data provide convincing evidence for the campaign manager’s claim.
* 1
* point
* 5.
* Gallup conducts an annual poll of U.S. residents. Approximately 1,000 residents across all 50 states and Washington D.C. are asked “Do you believe the use of marijuana should be made legal?” The distribution of responses by date of survey is shown in the table below. Imagine a hypothesis test evaluating whether there is a difference from 2012 to 2013 between proportions of “yes” responses. Using the information in the table below, calculate the standard error for this hypothesis test. Choose the closest answer.
* 0.5798
* 0.00048
* 0.4754
* 0.022
* 0.5274
* 1
* point
* 6.
* “In statistical inference for proportions, standard error (SE) is calculated differently for hypothesis tests and confidence intervals.” Which of the following is the best justification for this statement?
* Because in hypothesis testing, we assume the null hypothesis is true, hence we calculate SE using the null value of the parameter. In confidence intervals, there is no null value, hence we use the sample proportion(s).
* Because statistics is full of arbitrary formulas.
* Because if we used the same method for hypothesis tests as we did for confidence intervals, the calculation would be impossible.
* Because in hypothesis testing we’re interested in the variability of the true population distribution, and in confidence intervals we’re interested in the variability of the sampling distribution.
* 1
* point
* 7.
* At the beginning of a semester an anonymous survey was conducted on students in a statistics class. Two of the questions on the survey were about gender and whether or not students have equal, more, or less energy in the afternoon compared to the morning. Below are the results.
* What test should we perform to see if gender and energy level are associated?
* Chi-square test of independence
* F test
* Comparing two means
* Chi-square test of goodness of fit
* Z test
* Comparing two proportions
* hypothesis test for a single mean
* ANOVA
* 1
* point
* 8.
* A variety of studies suggest that 10% of the world population is left-handed. It is also claimed that artists are more likely to be left-handed. In order to test this claim we take a random sample of 40 art students at a college and find that 6 of them (15%) are left handed. Which of the following is the correct set-up for calculating the p-value for this test?
* Roll a 10-sided die 40 times and record the proportion of times you get a 1. Repeat this many times, and calculate the proportion of simulations where the sample proportion is 15% or more.
* Randomly sample 40 non-art students, and record the number of left-handed students in the sample. Repeat this many times and calculate the proportion of samples where at least 15% of the students are left-handed.
* In a bag place 40 chips, 6 red and 34 blue. Randomly sample 40 chips, with replacement, and record the proportion of red chips in the sample. Repeat this many times, and calculate the proportion of samples where at least 10% of the chips are red.
* Roll a 10-sided die 40 times and record the proportion of times you get a 1. Repeat this many times, and calculate the proportion of simulations where the sample proportion is 10% or more.
* 1
* point
* 9.
* True or false: The χ2 statistic is always non-negative.
* False
* True
* 1
* point
* 10.
* 80% of Americans start the day with a cereal breakfast. Based on this information, determine if the following statement is true or false.
* “The sampling distribution of the proportions of Americans who start the day with a cereal breakfast in random samples of size 40 is right skewed.”
* True
* False
* 1
* point
* 11.
* At a stop sign, some drivers come to a full stop, some come to a ‘rolling stop’ (not a full stop, but slow down), and some do not stop at all. We would like to test if there is an association between gender and type of stop (full, rolling, or no stop). We collect data by standing a few feet from a stop sign and taking note of type of stop and the gender of the driver. What are the hypotheses for testing for an association between gender and type of stop?
* H0: Males and females are equally likely to come to a rolling stop.
* HA: Males are more likely than females to come to a rolling stop.
* H0: Gender and type of stop are associated.
* HA: Gender and type of stop are independent.
* H0: Males and females are equally likely to come to a full stop.
* HA: Males and females are not equally likely to come to a full stop.
* H0: Gender and type of stop are independent.
* HA: Gender and type of stop are associated.
* 1
* point
* 12.
* Does Weight Watchers work? Researchers randomly divided 500 people into two equal-sized groups. One group spent 6 months on the Weight Watchers program. The other group received a pamphlet about controlling portion sizes. At the end of the study 35% of the subjects in the pamphlet group and 55% of the subjects in the Weight Watchers group had lost at least 10 pounds. To test whether Weight Watchers is more effective for weight loss than pamphlets, a statistician used an index card to represent each subject in the study and wrote whether or not the subject lost at least 10 pounds on the index card. He then shuffled these cards together, and dealt them into two equal-sized groups. Which of the following best describes the expected result?
* The difference between the proportions of cards indicating whether or not the subject lost at least 10 pounds will be about 0.
* The difference between the proportions of cards indicating whether or not the subject lost at least 10 pounds will be about 20%.
* If Weight Watchers was effective, the difference between the proportions of cards indicating whether or not the subject lost at least 10 pounds will be more than 20%.