

Stat 185 - Final Exam

Name: _____

Please write all your solutions (answers with organized supporting work) on separate paper, put your name on this sheet, and staple it all together when you turn it in. I don't plan to grade anything written on the exam sheet itself.

The basics

If you score 92% or higher on this section, then you *will* pass the class.

1. Suppose we randomly select 200 college students and measure their heights in feet. We find that our data has an average of 5.8 with a standard deviation of 0.37. We wish to write down a 95% confidence interval for this data.
 - (a) Find the standard error associated with this sample.
 - (b) Write down a 95% confidence interval for the average height of college students based on this data.
2. Suppose we randomly select 4 college students, measure their heights in feet and find them to be

5.7	5.2	6.1	5.9
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- (a) Write down a formula showing that the mean of these heights is 5.725.
 - (b) Write down a formula showing that the standard deviation of these heights is approximately 0.386
 - (c) Find the standard error associated with this sample.
 - (d) Write down a 90% confidence interval for the average height of college students based on this data.
3. Supposedly, approximately 11% of the population is left handed, but we think it might be higher than that. Suppose that in a random sample of 85 people, we find 18 left handers. Let's use this data to explore the question of whether the 10% estimate is truly correct vs whether there might be more than 11%.
 - (a) Write down the Null and Alternative Hypotheses for this problem.
 - (b) Compute the standard error, test statistic, and p -value.
 - (c) State the conclusion of the hypothesis test and your reasons why.

A bit more

4. The table below lists student enrollment by state region for all 3281 NC students. Suppose we draw a random sample of 30 of those students. Use a normal distribution to estimate the probability that more than 17 of those 30 students are *not* from Eastern NC.

Region	Western NC	Piedmont	Eastern NC	Total
Enrollment	1508	1541	232	3281

5. A statistics professor teaching two sections of the same introductory statistics course is concerned that exam scores in one section (let's call it section A) are noticeably lower than exam scores in another section (section B). To test this hypothesis, he computed the mean and standard deviation for the combined scores on the first three exams for both classes and found the following:

Section A: Mean=169, std dev = 59, number of students = 30

Section B: Mean=204, std dev = 52, number of students = 30

Viewing these data as samples from a random process, find

- The difference between the two means.
 - The associated standard error and test statistic.
 - Compute the p -value using a normal distribution.
 - From the computations, can we conclude with a 95% level of confidence that section A scores lower than class B?
6. Suppose you ask two friends to play rock-paper-scissors and count the times each option is played. The table below summarizes the data. Use a one-way χ^2 -test to evaluate whether these data support the hypothesis that players choose between these three options randomly, or if certain options are favored above others.

Rock	Paper	Scissors
43	21	35

A regression problem

7. I ran a linear regression on a random sample of 100 racers in the Peachtree Road Race to determine if there is a relationship between race time and age. The results are shown in the following table:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	46.31345	1.14506	40.446	.2e-16
age	0.03906	0.03062	1.276	0.205

- Write down the hypothesis statement that we would check with this linear model.
- Write out the formula for linear model.
- What does the model predict for the race time of a runner who is 32 years old?
- State the conclusion of the hypothesis test from part (a).