

Stat 185 - Review problems for Exam 3

Our third exam is next Monday, November 20. Here are a few problems to get you thinking. There's a good chance that *most* or even all of these problems will be represented on the exam. There might be one or two more, as well.

1. Students purchased 6 bags of potato chips marked 28.3 grams. Weighing the contents of each bag, they found the following masses:

$$29.3 \mid 28.2 \mid 29.1 \mid 28.7 \mid 28.9 \mid 28.5$$

- (a) Perform a t -test to determine
 - i. Whether we should accept the 28.3 gram measurement with a 95% level of confidence
 - ii. A 95% confidence interval.
 - (b) What is the critical value t^* for a 95% level of confidence?
2. Suppose that we'd like to compare the average incomes of chemistry professors vs math professors. A random sample of 12 chemistry professors found that their average salary was \$101,479 per year with a standard deviation of \$4126. A random sample of 10 math professors found that their average salary was \$92,842 per year with a standard deviation of \$3096.
 - (a) Write down the hypothesis test.
 - (b) Compute the standard error for the problem.
 - (c) Compute the test statistic.
 - (d) Use a t -table to find the t^* -value for a 95% level of confidence
 - (e) What is the conclusion of the test?
 - (f) Why shouldn't we use a normal table to compute a p value?
 3. In a sample of 52 Republicans, 40 were for issue 1 and 12 against. In a sample of 79 Democrats, 65 were for issue 1 and 14 against. Let's use this data to explore whether there is a genuine difference in the views of Democrats and Republicans on issue 1 to a 95% level of confidence.
 - (a) Compute the observed proportions \hat{p}_R and \hat{p}_D , as well as the difference

$$\hat{p} = \hat{p}_D - \hat{p}_R.$$

- (b) Compute the standard error.
 - (c) Compute the test statistic.
 - (d) Use a normal table to compute the p -value.
 - (e) State the conclusion of the test.
 - (f) Why was it OK to use a normal table?
4. A random sample of 18 college texts compared their local bookstore price to their amazon.com price. The data indicate that, on average, the local price minus the amazon price was \$22 with standard deviation of \$4. We are curious if the amazon price is generally *less* than the book store price.
- (a) Write down the hypothesis test.
 - (b) Compute the standard error for the problem and test statistic.
 - (c) State what test you plan to use for this problem and why
 - (d) What is the conclusion of the test and what is your supporting evidence?
5. A college statistics professor expects to assign grades in the following proportions

Grade	A	B	C	D	E
Expected Percentage	10%	30 %	40%	20%	0%
Actual count	3	6	8	1	0

Perform a χ^2 test to examine whether these grade counts agree with the expected grade counts.

6. Data relating favorite outdoor activities is shown in table 1 below. Suppose I run a `chisq.test` command on this table and generate the following output:

Pearson's Chi-squared test

X-squared = 10.424, df = 6, p-value = 0.1079

- (a) Draw a picture illustrating how X-squared and p-value fit together.
- (b) What hypothesis statement is associated with this test?
- (c) How should you interpret the p -value?

	NE	SE	NW	SW
Mountain Bike	24	52	36	37
Road Bike	32	42	38	45
Rock Climb	19	37	28	55

Table 1: Favorite outdoor activities by region