Stat 185 - Review problems for Exam 3

Our third exam is next Wednesday, April 13. Here are a few problems to get you thinking.

1. According to our Office of Financial Aid, the average cost of textbooks at UNCA is \$600 per semester but I think it might be less than that. A random sample of 75 UNCA students found the average cost to be \$552.80 with a standard deviation of \$195.25. Let's run a hypothesis test to to see if this data supports the belief.

   (a) Write down the hypothesis test as an equation H_0 and an inequality H_A.

   (b) Compute the test statistic for your hypothesis test.

   (c) Use the normal distribution to compute the p-value.

   (d) What conclusion can you draw from your hypothesis test?

2. It is believed that nearsightedness affects about 8% of all children. In a random sample of 194 children, 21 are nearsighted.

   (a) Construct hypotheses appropriate for the following question: do these data provide evidence that the 8% value is inaccurate?

   (b) What proportion of children in this sample are nearsighted?

   (c) What is the test-statistic for this hypothesis test?

   (d) What is the conclusion of the hypothesis test?

3. A random sample of 81 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 \$42.1. 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) What is the conclusion of the test and what is your supporting evidence?

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

   $$29.32 \mid 28.2 \mid 29.1 \mid 28.7 \mid 28.9 \mid 28.98$$

   Note that the mean of this list is 28.7 and the standard devation is 0.367.
   Write down a 95% confidence interval for the mass of the chips.

5. Continuing with the same data on six bags of potato chips with mean 28.7 grams and standard deviation 0.367 grams, let's run a hypothesis test to see if the mass is truly 28.3 grams.

   (a) Write down the hypothesis test, paying careful attention to if it is one sided or two sided.

   (b) Compute the test statistic.

   (c) Refferring to a t-table, determine the critical cut off for a 95% level of confidence.

   (d) State the conclusion of your hypothesis test.

6. 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?

7. 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?