Practice Problems 7: *Confidence Intervals*

A. From your Book:

- Units 6.2, 6.3 & 7.2, 7.3

B. Additional Problems:

1. A recent poll of the California voters found that 300 of the 564 people surveyed were disapproved of the policies of Gov. Schwarzenegger. In a survey like this, we might be interested in whether a clear majority or minority of the voters disapprove of the job of the governor.

   (a) State the null hypothesis and alternative hypotheses in terms of the parameter.

   (b) Calculate a test statistic.

   (c) Calculate a P value for this test.

   (d) What do you conclude from the data at 0.05 level?

2. An inspector is worried that a video poker machine may be cheating. The posted odds say that the player wins 45.5% of the time. Volunteers played the machine 315 times and won 125 times. Is there statistical evidence at an $\alpha = 0.05$ level that the machine is cheating the players?

   (a) State the null and alternative hypothesis in terms of the parameter.

   (b) Calculate the appropriate test statistic.

   (c) Calculate the P value for this test.

   (d) What would you conclude about the machines?

3. Of the students admitted to UCSB this year, 85% had a GPA better than 3.7. Of all the students admitted, 4,004 accepted the admissions offer and plan to attend next year. A survey of 175 of those students who have accepted found that only 136 had a GPA better than 3.7. The University is worried that the students coming to UCSB have lower GPA's than the pool of students that are admitted.

   (a) In this survey, what is the population?

   (b) Find a 95% confidence interval for the population proportion.

   (c) Would you conclude that the students accepting the admissions offer are significantly less likely than the admitted students to have a GPA better than 3.7? In other words, is $p < 0.85$?

   (d) Suppose that $p = 0.85$, then what is the probability that a sample of 175 would have 110 or fewer students with GPA's better than 3.7?

(e) What would you conclude from this last result? Is the University justi
ed in worrying that the proportion of high GPA's is down among the students that accept or could this be just due to chance?

4. An herbalist is experimenting with juices extracted from berries and roots that may have the ability to improve the IQ test scores of students affected with Attention Deficit Disorder (ADD). A random sample of 275 students with ADD have been drinking the concoction daily for two months. Past experience suggests that students with ADD have IQ test scores with a mean of 95. The sample of students had an average test score $\mu = 99.3$ with $s = 40$.

   (a) Propose an appropriate null and alternative hypothesis for this test in terms of the parameter μ.

   (b) Calculate the appropriate test statistic for this experiment.

   (c) Calculate the P value according to the alternative hypothesis that you have selected.

   (d) What would you conclude about the effect of the berries?

5. The current computer system in the statistics department seems to be prone to periodic failures. The average time to failure for the system is about 18 days. A new Linux system is proposed that will hopefully be more stable. In 5 experimental runs, the time between failures was

$$16, 24, 24, 23, 16$$

   (a) Calculate $\bar{x}$ and s for this data.

   (b) Write out an appropriate null and alternative hypothesis for this test explicitly in terms of the parameters.

   (c) Calculate the appropriate test statistic.

   (d) Because this is a small sample we have to find a critical value. Look up the appropriate critical value in the table for a 0.05 level test.

   (e) Is this a statistically significant improvement over the old system at an 0.05 level?