Name: _____   Date: _____   AP Statistics

Use a separate sheet of paper. You must show all work and all steps must be clearly labeled. Submitting just answers will result in a grade of 0! All unexplained numbers will be ignored and final answers must be written in complete sentences.

Inference for Proportions, Chp 12

1. In a study of air-bag effectiveness, it was found that in 821 crashes of midsize cars equipped with air bags, 46 of the crashes resulted in hospitalization of the drivers. *(See Chp 12 powerpoint online for answer.)*
   a. Give a 95% confidence interval for the percent of crashes resulting in hospitalization. Interpret the confidence interval and the confidence level.
   b. Use a 0.01 significance level to test the claim that the air-bag hospitalization rate is lower than the 7.8% rate for crashes of mid-size cars equipped with automatic safety belts.
   c. How large a sample would be needed to obtain the same margin of error in part "a" for a 99% confidence interval?

2. In a consumer taste test, a random sample of 100 regular Pepsi drinkers are given blind taste of Coke and Pepsi; 48 of these subjects preferred Coke.
   a. Give a 60% confidence interval for the percent of consumers who still prefer Pepsi.
   b. Use a 5% level of significance to test the claim that Coke is preferred by 50% of Pepsi drinkers who participate in such blind taste tests.
   c. How large a sample would be needed to reduce the margin of error for part "a" to 1%?

3. Columbia Pictures chairman claims that 58% of movies made are R-rated.
   a. If 60 movies were included in a random sample and 41 were R-rated, test this claim using a .10 significance level.
   b. If every movie produced in 2000 were used as the data, comment on the accuracy of running the same significance test.

4. In 1990, 5.8% of job applicants who were tested for drugs failed the test.
   a. Test the claim that the failure rate is now lower if a random sample of 1520 current job applicants results in 58 failures. $\alpha = .01$
   b. Give a 99.8% confidence interval for the percent of drug test failures.
   c. How many fewer samples could be used if the margin of error remained the same as in part "b" but for a 90% confidence interval?

5. According to the article "Which Adults Do Underage Youth Ask for Cigarettes?" 43.6% of the 149 18-to-19 year olds in a random sample have been asked to buy cigarettes for an underage smoker. Is there convincing evidence that an underage smoker has approached fewer than half of 18- to 19-year-olds to buy cigarettes? $\alpha = .02$.

6. According to a 1998 survey of 4000 randomly selected teachers, many full-time public school teachers feel inadequately prepared for various classroom situations. Of those surveyed, 21% indicated that they felt unprepared to address the needs of students with disabilities and 20% stated that they felt unprepared to integrate technology into the grade or subject they taught.
    a. Construct a 99% confidence interval for the true proportion of teachers who feel unprepared to integrate technology into the classroom.
    b. Construct a 95% confidence interval for the proportion of teachers who feel unprepared to address the needs of students with disabilities.
    c. How large a sample would be required to obtain a margin of error of 0.01 in a 99% confidence interval for the proportion of teachers unprepared to address the needs of students with disabilities?

7. *We want to estimate the proportion of Philadelphia families with children enrolled in preschool. In a random sample of 50 Philadelphia families with children of preschool age, 35 had children enrolled in preschool. Find a 95% confidence interval for the current true proportion of Philadelphia families with children enrolled in preschool.

8. *In a given year, 13.5% of employed people in the United States reported belonging to a union. Officials from a large city contacted a random sample of 2000 city workers and 240 claimed union membership. Is there sufficient evidence to conclude that the proportion of workers in this city who are union members is different from the national rate?

9. **Alcohol abuse has been described by college presidents as the number one problem on campus, and it is an important cause of death in young adults. How common is it? A 2001 survey of 10,904 US college students collected information on drinking behavior and alcohol-related problems. The researchers defined "frequent binge drinking" as having five or more drinks in a row three or more times in the past two weeks. According to this definition, 2,486 students were classified as frequent binge drinkers. That's 22.8% of the sample. Based on these data, what can we say about the proportion of all college students who have engaged in frequent binge drinking? Use the Harvard School of Public Health survey data to give a 99% confidence interval for the proportion of college - students who have engaged in frequent binge drinking.

10. **According to the National Institute for Occupational Safety and Health, job stress poses a major threat to the health of workers. A national survey of restaurant employees found that 75% said that work stress had a negative impact on their personal lives. A random sample of 100 employees from a large restaurant chain finds that 68 answer "Yes" when asked, "Does work stress have a negative impact on your personal life?" Is this good reason to think that the proportion of all employees in this chain who would say "Yes" differs from the national proportion $p_o = 0.75$?