A.P. Statistics
Assignment 9.6

Remember to show your thinking through your work.

1)   As part of a quality improvement program, your mail-order company is studying the process of filling customer orders. According to company standards, an order is shipped on time if it is sent within 3 working days of the time it is received. You select an SRS of 200 of the 5000 orders received in the past month for an audit. The audit reveals that 185 of these orders were shipped on time. Find a 95% confidence interval for the true proportion of the month's orders that were shipped on time.

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2)   Large trees growing near power lines can cause power failures during storms when their branches fall on the lines. Power companies spend a great deal of time and money trimming and removing trees to prevent this problem. Researchers are developing hormone and chemical treatments that will stunt or slow tree growth. If the treatment is too severe, however, the tree will die. In one series of laboratory experiments on 216 sycamore trees, 41 trees died. Give a 95% confidence interval for the proportion of sycamore trees that would be expected to die from this particular treatment.

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3)   A university financial aid office polled an SRS of undergraduate students to study their summer employment. Not all students were employed the previous summer. Here are the results for men and women:

	Men	Women
Employed	718	593
Not employed	79	139
Total	797	732

(a)   Is there evidence that the proportion of male students employed during the summer differs from the proportion of female students who were employed? State H_0 and H_a, compute the test statistic, and give its P-value.

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(b)   Give a 99% confidence interval for the difference between the proportions of male and female students who were employed during the summer. Does the difference seem important?

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4)   A clinical trial examined the effectiveness of aspirin in the treatment of strokes. Patients were randomized into treatment and control groups. The study was double-blind in the sense that neither the patients nor the physicians who evaluated the patients knew which patients received aspirin and which the placebo tablet. After six months of treatment, the attending physicians evaluated each patient's progress as either favorable or unfavorable.

Of the 78 patients in the aspirin group, 63 had favorable outcomes; 43 of the 77 control patients had favorable outcomes.

(a) Compute the sample proportions of patients having favorable outcomes in the two groups.

(b) Give a 90% confidence interval for the difference between the favorable proportions in the treatment and control groups.

(c) The physicians conducting the study had concluded from previous research that aspirin was likely to increase the chance of a favorable outcome. Carry out a significance test to confirm this conclusion.

5) The pesticide diazinon is in common use to treat infestations of a German cockroach. A study investigated the persistence of this pesticide on various types of surfaces. Researchers applied a 0.5% emulsion of diazinon to glass and plasterboard. After 14 days, they placed 18 cockroaches on each surface and recorded the number that died within 48 hours. On glass, 9 cockroaches died, while on plasterboard, 13 died.

(a) Calculate the mortality rates (sample proportion that died) for the two surfaces.

(b) Find a 95% confidence interval for the difference in the two population proportions.

(c) Chemical analysis of the residues of diazinon suggests that it may persist longer on plasterboard than on glass because it binds to the paper covering on the plasterboard. The researchers therefore expected the mortality rate to be greater on plasterboard than on glass. Conduct a significance test to assess the evidence that this is true.