Dr. Sravani Vadlamani
Florida Polytechnic University

Assignment 10

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The objective of this homework is to identify appropriate statistical methods for given problems, apply and interpret statistical techniques and evaluate applications of statistical techniques

Problem 1

Legalization of marijuana. The 2010 General Social Survey asked 1,259 U.S. residence; "Do you think the use of marijuana should be made legal or not? 48% of the respondents said it should be legal.

(a) Is 48% a sample statistic or a population parameter?
(b) Construct a 95% CI for the proportion and interpret.
(c) A news piece on this survey's findings states "majority of Americans think marijuana should be legalized." Based on your CI, is this news piece statement justified?

Problem 2

Among a simple random sample of 331 American adults who do not have four-year college degree and are not currently enrolled in school, 48% said they decided not to go to college because they could not afford school. A newspaper article states that only a majority of the Americans who decide not to go to college do so because they cannot afford it and uses the point estimate from the survey as evidence. Conduct a hypothesis test to determine if these data provide strong evidence supporting this statement.

(a) What are the hypotheses for evaluating this test?
(b) The test statistic is?
(c) Based on the p-value for this test, what is the conclusion?
(d) Would you expect a confidence interval for the proportion of Americans adults who decide not to go to college because they cannot afford it to include 0.5?
(e) Calculate a 90% confidence interval for the proportion of Americans who decide to not go to college because they cannot afford it, and interpret the interval.

Problem 3

The Stanford University Heart Transplant Study was conducted to determine whether an experimental heart transplant program increased lifespan. Each patient entering the program was officially designated a heart transplant candidate, meaning that he was gravely ill and might benefit from a new heart. Patients were randomly assigned into a treatment and control groups. Patients in the treatment group received a transplant and those in the control group did not. The table below displays how many patients survived and died in each group.

	Control	Treatment

Alive	4	24
Dead	30	45

Explain why we cannot construct a confidence interval or a hypothesis test (hint: consider the conditions).

Problem 4

A 30-year study was conducted with nearly 90,000 female participants.8 During a 5-year screening period, each woman was randomized to one of two groups: in the first group, women received regular mammograms to screen for breast cancer, and in the second group, women received regular non-mammogram breast cancer exams. No intervention was made during the following 25 years of the study, and we'll consider death resulting from breast cancer over the full 30-year period. Results from the study are summarized in the table. If mammograms are much more effective than non-mammogram breast cancer exams, then we would expect to see additional deaths from breast cancer in the control group. On the other hand, if mammograms are not as effective as regular breast cancer exams, we would expect to see an increase in breast cancer deaths in the mammogram group.

	Death from breast cancer	
	Yes	No
Mammogram	500	44,425
Control	505	44,405

a) Is this study an experiment or an observational study?
b) Set up hypotheses to test whether there was a difference in breast cancer deaths in the mammogram and control groups.

Problem 5

A 2010 survey asked 827 randomly sampled registered voters in California "Do you support? Or do you oppose? Drilling for oil and natural gas off the Coast of California? Or do you not know enough to say?" Below is the distribution of responses, separated based on whether or not the respondent graduated from college.

	College Grad	
	Yes	No
Support	154	132
Oppose	180	126
Do not Know	104	131
Total	438	389

a) What percent of college graduates and what percent of the non-college graduates in this sample do not knowenough to have an opinion on drilling for oil and natural gas off the Coast of California?
b) Conduct a hypothesis test to determine if the data provide strong evidence that the proportion of college graduates who do not have an opinion on this issue is different than that of non-college graduates.