

Exam 1 Sample

STA209-04: Applied Statistics

February 15, 2019

- 1) [10 pts] As the consulting statistician within a research hospital, you are approached by a physician interested in conducting a study to compare the efficacy of two kidney stone treatments. The first treatment, Treatment A, is an invasive surgical procedure whereas the second treatment (B) involves only a small incision. Both treatments are known to be efficacious, but interest is in determining which of the two is more effective. Recognizing their own lack of statistical training, the physician is looking to you for guidance and has prepared several questions she feels are important to get started:
- a) Which study design - observational study or randomized experiment - do you recommend to determine which of these two treatments leads to an improved outcome? Why?
 - b) There are a few patients of mine that have shared with me an interest in receiving Treatment B. They've also provided me with their consent to participate in the study. Should I include them in my study and administer them treatment B? More generally, how should I recruit study participants?
 - c) Which population(s) can I generalize my results to?
- 2) [20 pts] A few months after your initial consultation, the physician returns with the following data:

Kidney Stone Size	Treatment A		Treatment B	
	# Improved	Total	# Improved	Total
Small	81	87	234	270
Large	192	263	55	80

Hoping that you could impart more of your statistical wisdom and expertise, the physician asks you to tell her which treatment is supported by the data. Towards this end, you consider the following questions:

- a) What are the cases for these data? What are the variables?
- b) What would be a good way to visualize these data?
- c) What are the marginal proportions for each treatment's success? What can we conclude based on these proportions?
- d) What are the success proportions for each treatment when we consider large and small kidney stones separately? What conclusion(s) can we draw from these proportions?
- e) Based on these analyses, what would you tell the physician? Is there evidence that one treatment is more effective than the other? If so, which treatment and why?