Dear all, this homework is due before class on Tuesday, February 13, 2024. Please submit it to SBU Brightspace. Quiz 2 of similar content (please review the entire lecture notes 4 and 5), will be given the week of February 13 as well. It will be a close book exam. (Most of our quizzes will be on R programming and will be open book exams – only the first few quizzes will be close book exams. At least the 3 lowest 3 quiz scores will be dropped for each student when computing the final quiz scores – so no worries if you did not do well in a few quizzes.)

1. To determine whether glaucoma affects the corneal thickness, measurements were made in 8 people affected by glaucoma in one eye but not in the other. The corneal thickness data (in microns) were as follows:

Person	1	2	3	4	5	6	7	8
Eye affected	488	478	480	426	440	410	458	460
Eye not affected	484	478	492	444	436	398	464	476

(a) According to the data, can you conclude, at the significance level of 0.10, that the corneal thickness is not equal for affected versus unaffected eyes?

(b) Calculate a 90% confidence interval for the mean difference in thickness.

2. Thanksgiving was coming up and Harvey's Turkey Farm was doing a land-office business. Harvey sold 100 gobblers to Nedicks for their famous Turkey-dogs. Nedicks found that 90 of Harvey's turkeys were in reality peacocks.

(a) Estimate the proportion of peacocks at Harvey's Turkey Farm and find a 95% confidence interval for the true proportion of turkeys that Harvey owns.

(b) (extra credit) How large a random sample should we select from Harvey's Farm to guarantee the length of the 95% confidence interval to be no more than 0.06? (Note: please first derive the general formula for sample size calculation based on the length of the CI for inference on one population proportion, large sample situation. Please give the formula for the two cases: (i) we have an estimate of the proportion and (ii) we do not have an estimate of the proportion to be estimated. (iii) Finally, please plug in the numerical values and obtain the sample size for this particular problem.

3. Treatment of Kidney Cancer
Historically, one in five kidney cancer patients (i.e. 20%) survive 5 years past diagnosis An oncologist using an experimental therapy treats n = 40 kidney cancer patients and 16 of them survive at least 5 years. Is there evidence that patients receiving the experimental therapy have a higher 5-year survival rate? Please test at the significance level of $\alpha = 0.05$. Please perform the following tests:
   (a) Large sample approximate test, required for all;
   (b) Exact test; required only for AMS graduate students and Data Science PhD students.