Complete the following problems in a R Markdown file and submit your compiled PDF.

Before you begin, you should set the random seed to your birthday month, day, and year. For example, April 11, 1992 would be 4111992. You should set the seed only once in your entire document.

Problem 1: Consider a characteristic whose population is normally distributed with mean 121.8 and standard deviation 34.7. A praticitioner studying this characteristic does not know anything about the population, but she suspects that the median is 121.8. The practitioner plans to take a random sample from the population to conduct a two-tailed hypothesis test using the sign-rank test. For sample sizes of 8, 24, and 48, conduct a Monte Carlo simulation to estimate the Type I error of the test the practicioner plans to conduct.

Problem 2: Consider a chi-squared distribution with 2 degrees of freedom, which has a population median of 1.386294. Repeat Problem 1 assuming the characterstic follows this distribution.

Problem 3: Compare the values determined in Problems 1 and 2 to your results for the one-sample t-test under these same conditions from Homework 7. (You do not need to rerun any code, but you should show your results again here.) What conclusions can you draw about the use of each test? Keep in mind what the tests are testing.

Problem 4: Use a Monte Carlo simulation to estimate the power of a similar sign-rank test to that planned in Problem 1 using each sample size. The difference is that the practitioner plans to use 115 for the null value.

Problem 5: Use a Monte Carlo simulation to estimate the power of the corresponding one-sample t-test to that planned in Problem 4 using each sample size.

Problem 6: Add the estimated power values determined in Problems 4 and 5 to the corresponding summary table created in Problem 3. Does this information change your conclusions?

Problem 7: Explain why power values calculated for the two tests when the data follow a chi-squared distribution are not comparable.