

Instructions:

1. Please use R markdown to produce your document as a PDF or Word document.
2. Provide all of your R commands with an R markdown code chunk.
3. If you produced a Word document, then please convert your Word document to a PDF format.
4. Submit your answers as a PDF in brightspace.

Questions

5. A certain type of storage battery lasts, on average 3 years with a standard deviation of 0.5 year. Assume that battery life has a normal distribution.
 - (a) find the probability that a given battery will last more than 3.5 years.
 - (b) Refer to part (a). Give a graph of the probability density that corresponds to this distribution. Shade the region that corresponds to the probability, and add the probability to the graph.
 - (c) Find the 75th percentile of the distribution battery life.
 - (d) Give the graph of the cumulative distribution, and add line segments to identify the 75th percentile on the plot.
6. Heart failure is due to either natural occurrences (87%) or outside factors (13%). Outside factors are related to induced substances or foreign objects. Natural occurrences are caused by arterial blockage, disease, and infection. Suppose that 20 patients will visit an emergency room with heart failure. Assume that causes of heart failure between individuals are independent.
 - (a) What is the probability at exactly 3 of the 20 patients have conditions caused by outside factors?
 - (b) What is the probability that three or more of the patients among the 20 patients have conditions caused by outside factors?
 - (c) What is the probability that three or less of the patients among the 20 patients have conditions caused by outside factors?

7. Arsenic concentration in public drinking water supplies is a potential health risk. An article in the Arizona Republic (May 27, 2001) reported drinking water arsenic concentrations in parts per billion (ppb) for 10 metropolitan Phoenix communities and 10 communities in rural Arizona. The data are in the file `drinking.csv`.
- (a) Import the data and display a few rows.
 - (b) Compute the mean, the standard deviation, and the sample size of the arsenic concentration according to region.
 - (c) Fit a linear model to describe the arsenic concentration as a function of the region. Using the fitted linear model, conduct the Levene test. What is the conclusion of the test?
 - (d) Assume that the arsenic concentrations according to region have a normal distribution with unequal variances. Conduct a t-test to compare the mean concentration of arsenic in drinking water in these two regions. Give your conclusion with the context of the problem.
 - (e) Display the arsenic concentration according to region with comparative boxplots. Is the plot consistent with your conclusions from part (c) and with your conclusions from part (d)? Discuss.