STA101 Problem Set 4

Summer I, 2021, Duke University

Exercises from the OpenIntro book

Chapter 4 exercises 4.4, 4.20, and 4.24.

Additional problems

Problem 4

A husband and wife both have blond hair but carry genes that make it possible for their children to have blond hair (probability 0.7), brown hair (0.2), or dark hair (0.1).

(a) What is the probability the first child with blond hair they have is their third child? Assume that the hair colors of the children are independent of each other.

(b) On average, how many children would such a pair of parents have before having a child with brown hair? What is the standard deviation of the number of children they would expect to have until the first child with brown hair?

Problem 5

On average, 25 buses arrive at a particular bus stop within an hour.

(a) Which distribution (that we have studied in this chapter) is most appropriate for calculating the probability of a given number of buses arriving at the bus strop within one hour?

(b) What are the mean and the standard deviation of the number of buses that arrive at this bus stop in one hour?

(c) Would it be considered unusually high if 35 buses stop by at this bus stop during one hour on a particular day?

(d) Calculate the probability that 20 buses arrive at this bus stop in one hour.

Problem 6

Scores of the verbal reasoning part of the GRE general test are distributed normally with a mean of 150 (out of 170) and a standard deviation of 8.5. Suppose a school council awards a scholarship to all students who score at least 160 in the verbal part of GRE. Suppose we pick one student among those awardees completely at random. What is the probability this student's score will be at least 165? (The material covered in Section 3.2 on conditional probability would be useful for this question.)