

Applied Statistics HW 12

1. John has a 4-sided die where the number 1 is twice as likely as the other three numbers. He proceeds to roll the die twice and add the outcomes. Denote by X the resulting sum, which is a random variable. Determine its probability distribution.

2. We flip an unfair coin up to four times as described here: Each time we get heads we get to flip again. So we flip until either we get tails or we have flipped four times. The coin is such that our chance of flipping heads is 80%. In order to play the game we had to put down \$2, and for each heads that we get we win \$1. Denote by X our total gain from playing the game (so what we made minus the deposit).

a. Draw a decision tree of the different possibilities for the game

b. Use this tree to construct a table for the values of X and their probabilities.

c. What are the chances, that we will gain money from playing this game?

d. Suppose we play this game twice. Construct a table of all the possible values for the total gain in both games together, and their probabilities.

3. We roll a 4-sided die two times. Each time it comes a 4, you win \$3, each time it comes 1 through 3 you lose a \$1. We denote by X the amount of money you gain from this game.

a. What are the possible values for X and their probabilities (i.e. the probability distribution of X)?

b. What are your chances of losing in this game?

4. Admissions is working through their data to try to estimate enrollment for the coming year. They separate the prospective students into three categories. Category A consists of students who for a number of reasons are very likely to come to Hanover. Only 5% of the prospective students fall into this category, however there is a 95% chance that a student in category A will decide to come here next year. Category B consists of students who have expressed an interest to some extent, in the form of deposits or campus visits. This category comprises 25% of the prospective students. A student in category B has a 65% chance of coming to Hanover. Finally, the remaining students are placed in category C. There is only a 32% chance that a student from category C will come to Hanover.

a. What percent of the prospective students would decide to come to Hanover?

b. What percent of the students in the incoming class will be from category A? How does that number compare to the percent of prospective students that are in category A? How does that make sense?

- c. Admissions decides to consolidate categories A and B. What percent of the students from this new category will come to Hanover? What percent of the incoming students will be from this new category?