

Applied Statistics HW 14

1. We have a 4-sided die where the side 1 is three times as likely as all the others.
 - a. Denote by X the outcome of rolling the die once. What is the probability distribution for X ?
 - b. What are the mean and standard deviation?

- c. Suppose we now roll the die twice. Denote by X_1 the outcome of the first roll, by X_2 the outcome of the second roll, and by Y the sum of the two outcomes. Describe how Y relates to the other two, and use this information to construct the probability table for Y .
- d. Compute the mean and standard deviation of Y both from the table directly, and using the formula on how Y relates to X_1 and X_2 and the mean and standard deviation values for those.

2. Peter has bought shares in two stocks. Let's denote by X the profit that one share of stock A makes for him after a week, and by Y the profit that one share of stock B makes for him after the same week. We don't of course know precisely what X, Y would be, but let's imagine that X has a mean of \$10 with a standard deviation of \$3, while Y has a mean of \$20 with a standard deviation of \$5, and also that they are independent of each other. He has 15 shares of stock A and 25 shares of stock B. The overall profit he makes would then be $Z = 15X + 25Y$. What are the mean and standard deviation for his overall profit?

3. Alice and Bob play the following game: They roll a 6-sided die ONCE. Alice earns a dollar as long as the die is 4 or more. Bob earns two dollars as long as the die is a 1 or a 6 (on that same roll). So it is possible that they both benefit from the roll, or only one of them, or neither. Let's denote by X the difference in dollars earned between Alice and Bob, namely how much Alice made minus how much Bob made.
- What is the probability distribution of X ?
 - What are the mean and standard deviation of X ?