

Homework 3

1. Consider the experiment of rolling a fair die twice, and let X be the sum of the two rolls. Then X takes the values $x_1 = 2, x_2 = 3, \dots, x_{11} = 12$.
 - Find the probabilities of all the possible values of X by direct counting and put them in the form of a table
 - What is the median of the resulting distribution?
2. Suppose X has the pmf $p(x) = \frac{c}{1+x^2}$, $x = 0, \pm 1, \pm 2, \pm 3$. Find the distribution of the random variable $Z = \sin\left(\frac{\pi}{2}X\right)$.
3. Consider the random variable X - the number of aces in one of the player's hand in a game of bridge. Note that X can take any of the values $x = 0, 1, 2, 3, 4$ while the remaining $13 - x$ cards in this player's hand must be non-ace cards.
 - (a) What is the pmf of X ?
 - (b) Compute the expected value of X
4. Suppose a fair coin is tossed n times. Let X be the number of heads obtained; then, $n - X$ is the number of tails obtained. Define $W = g(X) = \max\{X, n - X\}$. Compute the expectation EW for the case of $n = 4$.