Dr. Z.'s Intro to Probability Homework assignment 6

1. Two fair dice are rolled. Let X equal the product of the number of dots that show up.

(a) Compute $P(X = i)$ for $1 \leq i \leq 5$

(b) Find the expectation $E[X]$ (Hint: do it the clever way, as in probelem 6.7 of Lecture 6).

2. Let X be the winnings of a gambler and assume that

$$P(X=0) = \frac{1}{3} \quad ; \quad P(X=1) = \frac{13}{55} \quad ; \quad P(X=-1) = \frac{13}{55} \quad ;$$

$$P(X=2) = \frac{1}{11} \quad ; \quad P(X=-2) = \frac{1}{11} \quad ; \quad P(X=3) = \frac{1}{165} \quad ; \quad P(X=-3) = \frac{1}{165} \quad .$$

(a) Compute the conditional probability that gambler wins i, for $i = 1, 2, 3$, given that he wins a positive amount.

(b) Find $E[X]$, his expected winning.

3. The probability that you win i dollars $(1 \leq i \leq 5)$ is proportional to $\frac{1}{i}$.

(a) What is the probability of winning i dollars for $(1 \leq i \leq 5)$?

(b) What is the expectation of the amount won?

4. An n-faced fair die, marked with $1, 2, \dots n$ is rolled. What are

(a) The Expected number of dots of the landed face?

(b) The Expected number of the square of the number of dots of landed face?

(c) The Expected number of the cube of the number of dots of landed face?

5. The probability mass function of random variable X is given by $P(X = i) = e^{-2} \cdot 2^i / i!$, $i = 0, 1, 2, \dots$. Find the expectation, $E[X]$.

6. The number of injury claims per month is modeled by a random variable N with

$$P[N = n] = \frac{1}{(n+1)(n+2)}, \quad where \quad n \geq 0 \quad .$$

Determine the probability of at least one claim during a particular month, given that there have been at most four claims during that month.