

Recitation 4

ENEE324: Engineering Probability

Spring, 2018

The following problems are from the textbook.

Problem 2.3.13.

A family has 5 natural children and has adopted 2 girls. Each natural child has equal probability of being a girl or a boy, independent of the other children. Find the PMF of the number of girls out of the 7 children?

Problem 2.4.16.

Let X be a random variable with PMF

$$p_X(x) = \begin{cases} \frac{x^2}{a}, & \text{if } x = -3, -2, -1, 0, 1, 2, 3. \\ 0, & \text{otherwise} \end{cases}$$

1. Find a and $\mathbf{E}[X]$
2. What is the PMF of the random variable $Z = (X - \mathbf{E}[X])^2$?
3. Using the result from part(b), find the variance of X .
4. Find the variance of X using the formula $\text{var}(X) = \sum_x (x - \mathbf{E}[X])^2 p_X(x)$

Problem 2.4.19.

A prize is randomly placed in one of ten boxes, numbered from 1 to 10. You search for the prize by asking yes-no question. Find the expected number of questions until you are sure about the location of the prize, under each of the following strategies.

1. An enumerate strategy: you ask questions of the form "is it in box k ".
2. A bisection strategy: you eliminate as close to half of the remaining boxes as possible by asking questions of the form "is it in a box numbered less than or equal to k ?"

Problem 2.4.21.

You toss independently a fair coin and you count the number of tosses until the first tail appears. If this number is n , you receive 2^n dollars. What is the expected amount that you will receive? How much would you be willing to pay to play this game?

Problem 2.4.23(a).

A fair coin is tossed repeatedly and independently until two consecutive heads or two consecutive tails appear. Find the PMF, the expected value, and the variance of the number of tosses.