

Homework Day 11 - ECON 186

Problem 1. Let X be a random variable whose pmf is

$$f(x) = \begin{cases} \frac{1}{x(x+1)} & \text{for } x = 1, 2, 3, \dots, \\ 0 & \text{otherwise} \end{cases}$$

Find the mean of X .

Problem 2.

In a class of 50 students, the number of students n_i of each age i is shown in the following table:

Age i	n_i
18	20
19	22
20	4
21	3
25	1

If a student is to be selected at random from the class, what is the expected value of his age?

Problem 3. Suppose X is a random variable with pdf

$$f(x) = \begin{cases} \sqrt{x} & \text{for } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

Find the expected value and variance of X .

Problem 4. Show that two random variables X and Y cannot possibly have the following properties:

$$E(X) = 3, E(Y) = 2, E(X^2) = 10, E(Y^2) = 29, E(XY) = 0$$

Hint: Find the correlation of X and Y .

Problem 5. Compute the mean and variance of the Bernoulli distribution using the moment generating function.

Problem 6. Suppose we have two random variables X and Y where $E(X) = 5$, $E(Y) = 3$, $Var(X) = 6$, $Var(Y) = 2$, $Cov(X, Y) = 10$.

a. Compute $E(3Y - 2X + 7)$

b. Compute $Var(5X - Y + 2)$

Problem 7. A random variable X is normally distributed with mean 1 and variance 4. Find the value of each of the following probabilities:

a. $Pr(X \leq 3)$

b. $Pr(2 < X < 5)$

c. $Pr(1 \leq -2X + 3 \leq 8)$