Stat 134: Section 12

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Problem 1

Let X and Y be independent random variables with $E(X) = E(Y) = \mu$, $Var(X) = Var(Y) = \sigma^2$. Find $Var(XY)$

Problem 2

Suppose X and Y are independent with $P(X = j) = p(1-p)^j$ for $j = 0, 1, \ldots$ and $P(Y = k) = (k+1)p^2(1-p)^k$ for $k = 0, 1, \ldots$. Find the distribution of $Z = X + Y$. [Hint: Represent X and Y in terms of a biased coin-tossing sequence.]

Problem 3

Two fair dice are rolled independently. Let X be the maximum of the two rolls, and Y the minimum.

a. What is $P(Y = y|X = 3)$ for $y = 1, 2, 3, 4, 5, 6$

b. What is the joint distribution of X and Y.

Problem 4

Suppose N dices are rolled, where $1 \leq N \leq 6$.

a. Given that no two of the dices show the same face, what is the probability that one of the dice shows a six?

b. In a., the number of dice N was fixed, but now repeat assuming instead that N is random, determined as the value of another dice roll. Your answer now should be simply a number, not involving N.

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