

1. A sprinter covers on average 140 cm, with a standard deviation of 5 cm, in each stride. What is the approximate probability that this runner will cover the 100 m distance in 70 or fewer steps?
2. Suppose a fair die is rolled twice. Let X and Y be the larger and the smaller of the two rolls (note that X can be equal to Y). Each of X and Y takes the individual values of $1, \dots, 6$ and, of course, $X \geq Y$. As an example, by direct counting, $p(X = 2, Y = 1) = p(2, 1) = \frac{2}{36}$.
 - (a) Write down the entire joint pmf of (X, Y) in the form of a table
 - (b) What is $P(X = 1)$ and $P(X = 2)$?
3. In the experiment of three tosses of a fair coin, we have worked out (in the lecture slides) the joint pmf of (X, Y) where X is the number of heads in the first two tosses and Y is the number of heads in the last two tosses. Find the entire conditional distribution of X given $Y = 0$.
4. Consider again the example of the joint distribution of the maximum and the minimum of two rolls of a fair die. Let X be the maximum and Y be the minimum. Find the value of $E(X|Y = y)$ for all y . How does the conditional expectation behave as a function of y ?