

1. Suppose John has two fair six-sided dice, one red, the other blue.
 - a. Find the probability that, on a given roll of the two dice, their total is 8.
 - b. Find the probability that, in 12 rolls of this pair of dice, John's total is 8 for exactly 5 of those rolls.
 - c. Suppose John rolls repeatedly until the first time his pair of dice totals 8; find the probability that John requires exactly 5 rolls.
 - d. Suppose John rolls repeatedly until the 4th time his pair of dice totals 8; find the probability that John requires exactly 9 rolls.
 - e. Suppose that, in part c of this problem, John must toss a fair coin as many times, as he had to roll his pair of dice. Find the probability that John gets all "heads" on his cointoss(es).
 - f. Suppose that, in part e of this problem, John actually did get all heads on his cointoss(es). Find the probability that John tossed his coin exactly 4 times; interpret your answer.
 - g. In part d of this problem, what is the expected number of rolls required by John?

2. Let X be a rv with pdf given by $f(x) = cx^2$, for $2 < x < 5$, where c is a constant.
 - a. Determine the value of c .
 - b. Find $P(3 < X < 4)$.
 - c. Find the cdf F of X .
 - d. Compute $P(X > 3 \mid X < 4)$.
 - e. Compute $E(X)$.
 - f. Compute $\text{stdev}(X)$.
 - g. Compute $E[\sin(X) / X^2]$ exactly.
 - h. Compute the pdf of X^4 .
 - i. Suppose that 12 students each independently generate their own value of X . Find the probability that exactly 8 of those students generate a value greater than 3.
 - j. Suppose Y is a rv such that X and Y are iid (where X is the rv of this problem). Compute $\text{stdev}(5X - 3Y + 6)$.