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1. The game of craps is played as follows: A player rolls two dice. If the sum of the dice is either a 2, 3, or 12, the player loses: if the sum is either a 7 or an 11, he or she wins. If the outcome is anything else, the player continues to roll the dice until he or she rolls either the initial outcome or a 7. If the 7 comes first, the player loses; whereas if the initial outcome reoccurs before the 7, the player wins. Compute the probability of a player winning at craps.

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2. Urn I contains 3 white and 5 red balls, whereas urn II contains 2 white and 1 red ball. A ball is randomly chosen from urn I and put into urn II, and a ball is then randomly selected from urn II.

   (a) What is the probability that the ball selected from urn II is white?

   (b) What is the conditional probability that the transferred ball was white, given that a white ball is selected from urn II?

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3. Let X be a binomial random variable with parameters n and p. Show that

$$E\left[\frac{1}{X+1}\right] = \frac{1-(1-p)^{n+1}}{(n+1)p}.$$

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4. Let U denote a random variable uniformly distributed over $(0, 1)$. Compute the conditional distribution of U given that

   (a) $U > a$;

   (b) $U < a$;

   where $0 < a < 1$.