

1. A gambler has \$2 and needs to increase it to \$10 in a hurry. He can play a game with the following rules: a fair coin is tossed; if a player bets on the right side, he wins a sum equal to his stake, and his stake is returned; otherwise he loses his stake. The gambler decides to use a bold strategy in which he stakes all his money if he has \$5 or less, and otherwise stakes just enough to increase his capital, if he wins, to \$10. Let $X_0 = 2$ and let X_n be his capital after n throws. Prove that the gambler will achieve his aim with probability $1/5$. What is the expected number of tosses until the gambler either achieves his aim or loses his capital?