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A discrete dynamical model for gambler's ruin

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Gambler's ruin is a concept in Statistics. That is, regardless of their betting strategy, a gambler playing a game with negative anticipated value will eventually go bankrupt. A typical roulette wheel in the U.S. contains a loose ball and 38 slots: 18 for red numbers, 18 for black numbers, and 2 for green numbers. Assume we bet $1 that a red number would appear on the next spin of the wheel. This indicates that if red appears, we earn $1; if black or green appears, we lose $1. In view of those investigations, we propose a dynamical system model which gives an idea of probability on eventual win or loss. In this task we developed a tree diagram to model this situation and obtained a second order dynamical system in the standard format. We considered the case in which we arrive at the casino with $n and continue betting $1 on red until we get a total of $0 or $m, m>n. A simple roulette scenario was studied and calculated $P_L(n)$ which is the probability of leaving the casino with no money. To find $P_L(n)$ we need $P_L(1)$ and made trial-and-error guesses for the correct value of $P_L(1)$. This study on a simpler roulette scenario is useful to study any kind of roulette. Dynamical system gives us an idea of probability of eventual win from which one can check whether it is possible to go home in a happy mode!

Keywords: Gambling, Roulette, probability, casino

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