Yaakov Malinovsky, University of Maryland, Baltimore County

Hitting Primes by Dice Rolls

Let $S = (d_1, d_2, d_3, \ldots)$ be an infinite sequence of rolls of independent fair dice. For an integer $k \geq 1$, let $L_k = L_k(S)$ be the smallest i so that there are k integers $j \leq i$ for which $\sum_{t=1}^{j} d_t$ is a prime. Therefore, L_k is the random variable whose value is the number of dice rolls required until the accumulated sum equals a prime k times. We first compute the expectation and the variance of L_1 up to an additive error of less than 10^{-4} . The proof is simple, combining a basic dynamic programming algorithm with a quick Matlab computation and basic facts about the distribution of primes. Next, we show that for large k, the expected value of L_k is $(1 + o(1))k \log_e k$, where the $o(1)$-term tends to zero as k tends to infinity.

Based on the following works:

- https://arxiv.org/pdf/2209.07698
- https://arxiv.org/pdf/2502.08096

Round Robin Tournaments with a Unique Maximum Score

Richard Arnold Epstein published the first edition of "The Theory of Gambling and Statistical Logic" in 1967. He introduced some material on classical round robin tournaments (complete oriented graphs) with n labeled vertices; in particular, he stated, without proof, that the probability that there is a unique vertex with the maximum score tends to one as n tends to infinity. We give proof of this result for a general round-robin tournament model, which includes the Epstein model.

Based on the following works:

- https://ajc.maths.uq.edu.au/pdf/89/ajc_v89_p024.pdf
- https://arxiv.org/pdf/2411.02141