

Hitting a Prime in 2.43 Dice Rolls (on average) and on Round-Robin Tournaments with a Unique Maximum Score

Yaakov Malinovsky, University of Maryland, Baltimore County

I will discuss two problems (if time, 48 minutes, allows) according to the order in the title:

1. What is the number of rolls of fair 6-sided dice until the first time the total sum of all rolls is a prime? We compute the expectation and the variance of this random variable up to an additive error of less than 10^{-4} , showing that the expectation is 2.4284.. and the variance is 6.2427... This is a solution of a puzzle suggested a few years ago by DasGupta in the Bulletin of the IMS, where the published solution is incomplete.

Joint work with Noga Alon.

2. Richard Arnold Epstein (1927-2016) published the first edition of "The Theory of Gambling and Statistical Logic" in 1967. He introduced some material on round-robin tournaments (complete oriented graphs) with n labeled vertices in Chapter 9; 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. Our object here is to give a proof of this result along with some remarks and comments.

Joint work with John W. Moon.

References

- Alon, N., Malinovsky, Y. (2022). Hitting a prime in 2.43 dice rolls (on average). <https://arxiv.org/pdf/2209.07698.pdf>
- Malinovsky, Y., Moon, J. W. (2022). On Round-Robin Tournaments with a Unique Maximum Score and Some Related Results. <https://arxiv.org/pdf/2208.14932.pdf>