

Survival Probabilities of a Probabilistic Counting-Out Game on a Line

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Our research focuses on the winning probability of a novel problem posted on a question-and-answer website. There are n people in a line at positions $1, 2, \dots, n$. For each round, we randomly select a person at position k , where k is odd, to leave the line, and shift the people at position i such that $i > k$ to position $i - 1$. We continue to select people until there is only one person left, who then becomes the winner. We are interested in which initial position has the greatest chance to win. Specifically, we have derived recursions to solve for exact values and the formula of the winning probabilities. We have also considered a variation of the problem, where people are grouped into triples, quadruples, etc., and the first person in each group is at the risk of being selected. We will also present various sequences we have discovered while solving the winning probabilities of the different variations, as well as other possible extensions and related findings concerning this problem.

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