A Circular Approach to the Broken Pick-Up Sticks Problem

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In this study, we propose a general solution to the Broken Pick-up Sticks Problem which is a variation of the well-known Broken Sticks Problem. Since its solution is unknown to the mathematical society, our approach is the first proposal to the solution of this problem. We converted the original linear stick elements into arced curvilinear elements which were placed onto a circle. We developed a novel method by focusing on the outer points where the arcs met to calculate the probability of forming a polygon. A computer simulation was written using the Monte Carlo Simulation Method. We found a formula that solves the Broken Pick-up Sticks Problem in complete generality. We managed to give a theoretical rigorous proof of this problem by applying the circler method. The general formula is consistent with the results obtained from computer simulation. Exploring the Broken Stick Problem will lead to improvements in probabilistic modeling calculations in various fields such as biology and finance. It has the potential to reveal solutions to many exciting questions, from the possibility of the formation of chemical elements to the first simple life forms.

Awards Won:
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