SIAM Student Chapter Seminar

Distances in Permutations

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Abstract: Given a permutation S on $\{1, 2, \ldots, n\}$, define its distance set to be $\{|S(i+1) - S(i)| : i = 1, \ldots, n-1\}$. For example, when $n = 5$, the permutation $(S(1), \ldots, S(5)) = (5, 1, 4, 2, 3)$ has distance set $\{1, 2, 3, 4\}$, however the permutation $(1, 2, 3, 4, 5)$ has distance set $\{1\}$. On average, how large is a distance set of a random permutation? If this expected number of distances is denoted E_n, the ratio $E_n/(n-1)$ approaches a limit. What is it?

The questions above were loosely motivated by random considerations regarding the graceful tree conjecture and graceful colourings of paths.

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Mathematics and Computer Science
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