Suppose you choose two points on a line segment uniformly at random, defining three smaller line segments. The probability that these three line segments satisfy the triangle inequality is $\frac{1}{4}$.
Similarly, if you choose five points on a line segment, it is conjectured that they can form a tetrahedron with probability $\frac{1}{79}$.

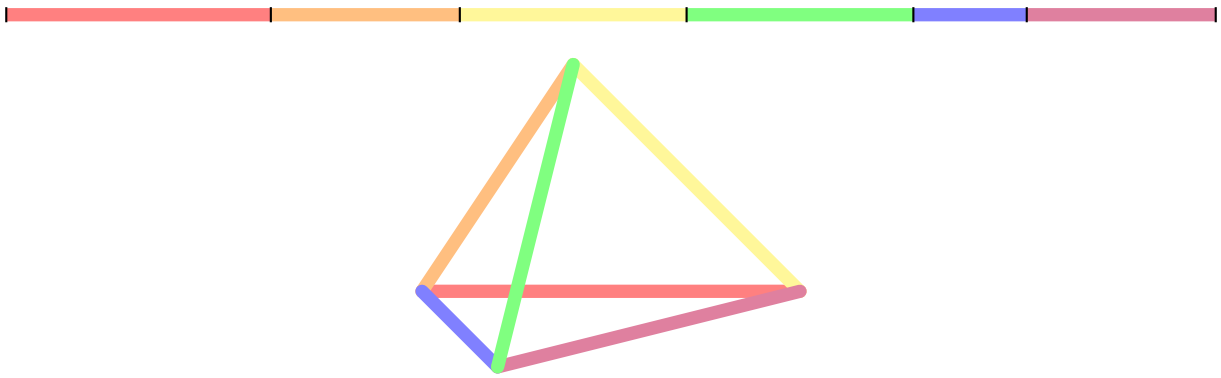

Figure 1: An example of a partition of a line segment and the resulting tetrahedron.

Question. If the line segment is split into $\frac{k(k+1)}{2}$ pieces using this prescription, do the resulting segments form a k-simplex with rational probability?

Related.

1. What if the segments form prescribed sides of the k-simplex? What if any configuration is valid?
2. What if there are more than $\frac{k(k+1)}{2}$ pieces, what is the probability that there exists some subset of $\frac{k(k+1)}{2}$ of them that forms a k-simplex?
3. What is the expected hyper-volume of such a tetrahedron?

References.

Problem 73.

Problem 78 also deals with a generalization of a Stack Exchange question.

`https://mathoverflow.net/q/142983/104733`