

Title: Chord length distribution

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Abstract: The thesis addresses the problem of the distribution of the length of a random chord, known as Bertrand's paradox. This paradox illustrates how different methods of choosing a random chord in a circle lead to different distributions of the lengths of these chords, highlighting the importance of defining randomness in geometric contexts. The aim of the paper is to derive in detail the distribution of the length of a random chord depending on the method of its generation. This problem is further extended to higher dimensions, specifically to a sphere, and also explores the distribution of the length of a random secant in a square. Finally, the obtained distributions are graphically compared, either by their densities or distribution functions.

Keywords: Bertrand paradox, chord length distribution, geometric probability, random chord

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