Octahedron tetrahedron picking: Expected volume of a random tetrahedron in a regular octahedron

Dominik Beck

February 1, 2022

Abstract

Expected value $E[V]$ of the volume V of a random tetrahedron whose vertices are independently and uniformly selected from a given regular octahedron with unit volume is determined via the Efron's formula. The exact valued turns out to be

$$E[V] = \frac{19297\pi^2}{3843840} - \frac{6619}{184320} = 0.013637411276524175460212315 33\ldots$$