

Summary of Tableau 6, Part 2

Probabilities in simple settings

Unexpected ramifications from the repeated toss of a coin, continuous spaces

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Continuous sample spaces

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- Intervals (rectangles, parallelepipeds) are the basic carriers of mass in continuous spaces.

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- A (probability) **density** is a non-negative function which integrates to unit over the whole space. It has units of mass per unit length (area, volume).

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$$\begin{aligned} p(x) &\geq 0 \\ \int_{-\infty}^{\infty} p(x) dx &= 1 \end{aligned}$$

$$\begin{aligned} p(x_1, \dots, x_n) &\geq 0 \\ \int_{-\infty}^{\infty} \cdots \int_{-\infty}^{\infty} p(x_1, \dots, x_n) dx_n \cdots dx_1 &= 1 \end{aligned}$$

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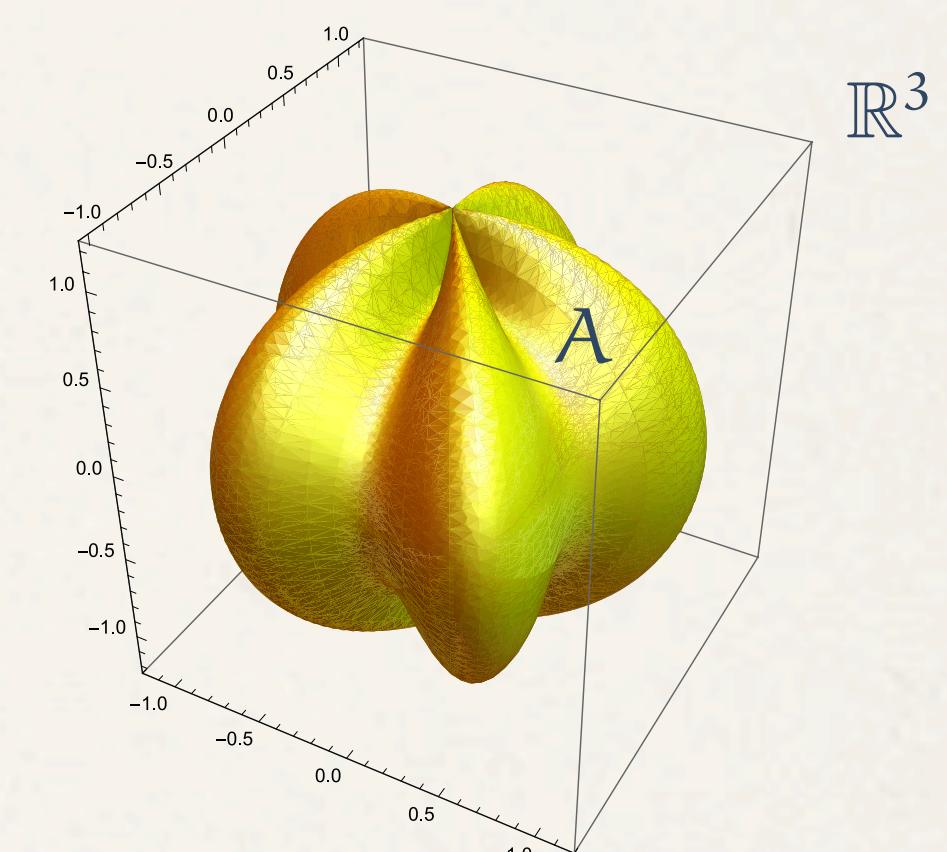
- * A (probability) **density** is a non-negative function which integrates to unit over the whole space. It has units of mass per unit length (area, volume).
- * The **probability measure** is determined by additivity as integral of the density over an appropriate region A . It may be identified as an area under the density curve.

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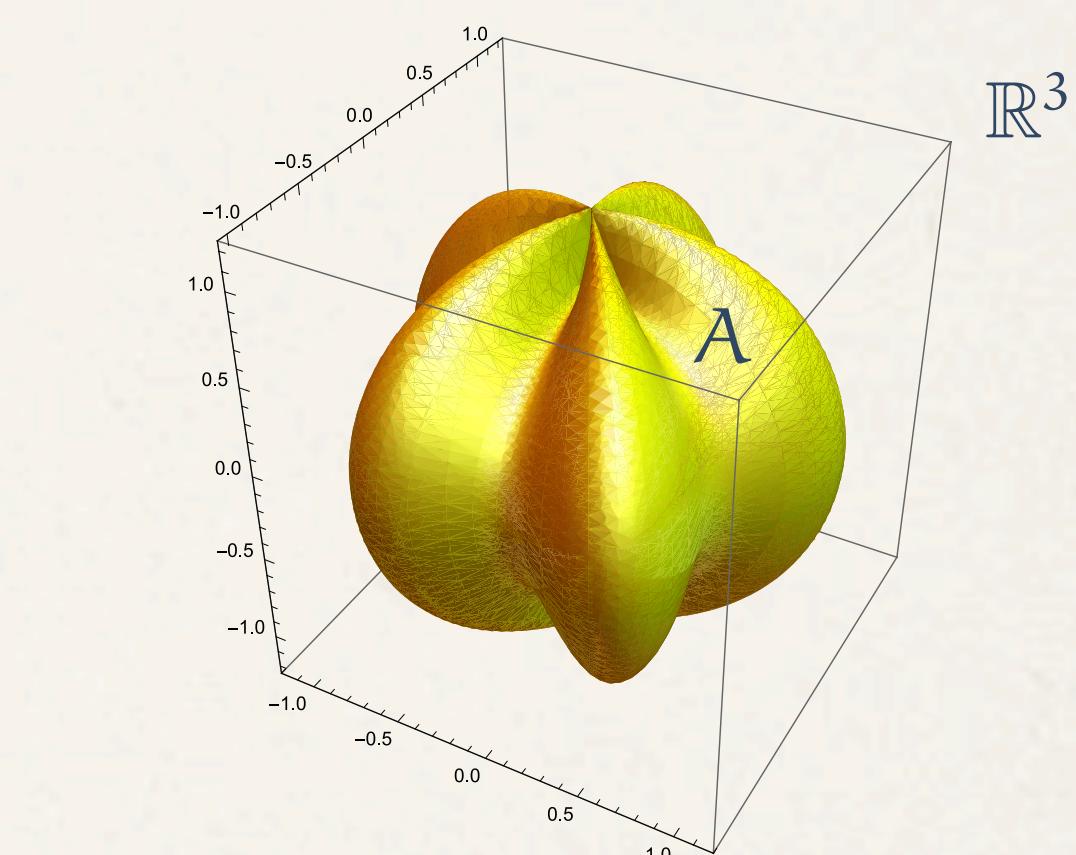
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$$P\{X \in A\} = \int_A p(x) dx$$



$$p(x_1, \dots, x_n) \geq 0$$

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$$P\{\mathbf{X} \in A\} = \int_A \cdots \int_A p(x_1, \dots, x_n) dx_n \cdots dx_1$$