Tableau 6, Part 2

Probabilities in simple settings
Unexpected ramifications from the repeated toss of a coin, continuous spaces

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The probabilist's trinity $(\Omega, \mathcal{F}, \mathbf{P})$

- What is the collection of conceptual outcomes of the chance experiment?
- What are the events of interest?
- What are the chances associated with the events?

Sample space: Ω

Algebra of events: $\mathcal{F}$

Probability measure: $\mathbf{P}$

Probability measure when the space is not discrete

Coin tosses, once again

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Toss a coin repeatedly without end

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- *Sample space* Ω: each sample point ω is an infinite sequence of heads and tails.
- Is there a simple characterisation of the *events?*
- What is an appropriate choice of *probability measure* **P**?

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  - Represent heads by 1 and tails by 0.
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  - $\Omega = \{ x_1x_2x_3 \ldots : x_n \in \{0, 1\} \text{ for each } n = 1, 2, 3, \ldots \}$
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  - Event A that the first head occurs on the fourth toss.
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- Is there a simple characterisation of the *events?*
  - Event A that the first head occurs on the fourth toss.
  - $A = \{ x_1x_2x_3 \ldots : x_1 = x_2 = x_3 = 0, x_4 = 1, x_n \in \{0, 1\} \text{ for each } n = 5, 6, 7, \ldots \}$
- What is an appropriate choice of *probability measure* $\mathbf{P}$?