

Probability basics (definitions & rules)

Definitions

Random phenomenon — outcome uncertain but with a regular distribution over many repetitions.

Probability model — (1) sample space S (all possible outcomes) and (2) probabilities for each outcome.

Event — set of outcomes of interest (e.g., “< 3 on a die”).

Disjoint (mutually exclusive) — A and B cannot happen together.

Independent — occurrence of A does not affect probability of B (coin tosses, etc.).

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Rules

1. Bounds - $0 \leq P(A) \leq 1$ | Probabilities can't be negative or >1 | If you ever get >1 , check math!
2. Certainty - $P(S)=1$ | Something must happen | “Whole sample space = 1”
3. Complement - $P(A^c)=1-P(A)$ | If $P(\text{rain})=0.2$, $P(\text{no rain})=0.8$ | Useful for “at least one” problems
- 4.



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