**Kolmogorov’s Axioms of Probability**

Let SSS be the **sample space**, and let P(A)P(A)P(A) represent the probability of an event AAA. The three fundamental axioms of probability are:

1. **Non-Negativity (Axiom 1)**

P(A)≥0for any event AP(A) \geq 0 \quad \text{for any event } AP(A)≥0for any event A

* + This means that probabilities are always **non-negative**; they cannot be less than 0.
  + No event can have a negative probability.

1. **Normalization (Axiom 2)**

P(S)=1P(S) = 1P(S)=1

* + The probability of the **entire sample space** (i.e., some event must occur) is always **1**.
  + This ensures that probability values are properly scaled between 0 and 1.

1. **Additivity (Axiom 3) – For Mutually Exclusive Events**  
   If AAA and BBB are **mutually exclusive events** (i.e., they cannot happen at the same time, A∩B=∅A \cap B = \emptysetA∩B=∅), then:

P(A∪B)=P(A)+P(B)P(A \cup B) = P(A) + P(B)P(A∪B)=P(A)+P(B)

* + This extends to any **finite** or **countably infinite** number of mutually exclusive events.

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