Probability

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1. Introduction

- **Experiment/Trial:** An uncertain situation.
- **Outcome:** Result of an uncertain situtation.
- **Sample space:** Set of all possible outcomes of an experiment.
- **Event:** Subset of the sample space.

Definition 1.1 (Field):
$\mathscr{F}$ is a field over Ω if it satisfies the following three properties:

1. $A, B \in \mathscr{F} \implies A \cup B \in \mathscr{F}$ and $A \cap B \in \mathscr{F}$.
2. $A \in \mathscr{F} \implies A^c \in \mathscr{F}$.
3. $\emptyset \in \mathscr{F}$.

Definition 1.2 (σ-field):
$\mathscr{F} \subseteq \mathscr{P}(\Omega)$ is a $\sigma - field$ if the following three properties are satisfied.

1. $A_1, A_2, \cdots \in \mathscr{F} \implies \bigcup_{i=1}^{\infty} A_i \in \mathscr{F}$.
2. $A \in \mathscr{F} \implies A^c \in \mathscr{F}$.
3. $\emptyset \in \mathscr{F}$.