Ω ("OMEGA") : SAMPLE SPACE

$\mathcal{F}$ ("F") : EVENT SPACE*
(SIGMA-ALGEBRA ON Ω)

P : PROBABILITY (MEASURE)

$\rightarrow (\Omega, \mathcal{F})$ MEASURABLE SPACE $\rightarrow (\Omega, \mathcal{F}, P)$ PROBABILITY SPACE

EXAMPLE

$\Omega = \{a, b, c\}$ ($n = 3$ ITEMS)

$\mathcal{F} = \{\emptyset, \underbrace{\{a,b,c\}}_{\Omega}, \{a\}, \{b\}, \{c\}, \{a,b\}, \{a,c\}, \{b,c\}\}$ ($2^n = 2^3 = 8$ ITEMS)

$P(\emptyset) = 0$

$P(\Omega) = 1$

$0 \leq P(\cdot) \leq 1$

$\mathcal{F}$ SIGMA-ALGEBRA IF:

1) $\Omega \in \mathcal{F}$ "BELONGS TO" (EX: $\{a,b,c\} \in \mathcal{F}$)

2) IF $E \in \mathcal{F}$, THEN $E^c \in \mathcal{F}$ (EX: $\underset{\in \mathcal{F}}{E = \{a\}}$, $\underset{\in \mathcal{F}}{E^c = \{b,c\}}$)

COMPLEMENT OF E

3) IF $E_1, E_2, E_3, \ldots$ ARE COUNTABLE EVENTS IN $\mathcal{F}$,
THEN $\bigcup_{i=1}^{\infty} E_i \in \mathcal{F}$

THE UNION CAN BE INFINITE, AS LONG AS IT IS COUNTABLE

(EX: $\underset{\in \mathcal{F}}{\{a\}} \cup \underset{\in \mathcal{F}}{\{c\}} = \{a,c\} \in \mathcal{F}$)

* FOR US, FOR THE MOMENT, $\mathcal{F} = 2^{\Omega}$, WHERE 2^{Ω} INDICATES THE POWER SET OF Ω.
$\boxed{\text{IN GENERAL}}$: $\mathcal{F} \subseteq 2^{\Omega}$.

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