
# Measure theory - Part 1

Length: $b-a$

different notions of length

$X$ set

$\mathcal{P}(X)$ power set $X$

Example: $X = \{a, b\}$, $\mathcal{P}(X) = \{\emptyset, X, \{a\}, \{b\}\}$

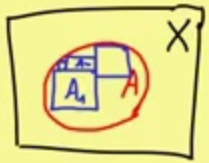
Definition: $A \subseteq \mathcal{P}(X)$ is.

**Definition:** $\mathcal{A} \subseteq P(X)$ is called a $\sigma$-algebra:

(a) $\emptyset, X \in \mathcal{A}$

(b) $A \in \mathcal{A} \Rightarrow A^c := X \setminus A \in \mathcal{A}$


(c) $A_i \in \mathcal{A}, i \in \mathbb{N} \Rightarrow \bigcup_{i=1}^{\infty} A_i \in \mathcal{A}$




$A \in \mathcal{A}$ is called a $\mathcal{A}$-measurable set.

**Example:** (1)