$\Omega = \{H, T\}$

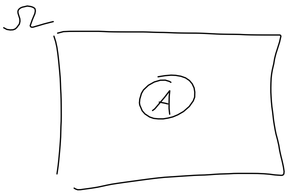
events: get head $\to H$

get tail $\to T$

get neither $\to \emptyset$

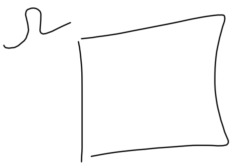
get either $\to \Omega$

$\mathcal{F} = \{\emptyset, H, T, \Omega\}$

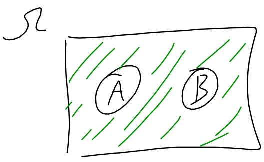


$\mathcal{F} = \{A, A^c, \emptyset, \Omega\}$

$\sigma(A) =$ ______

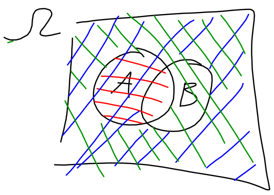


$\mathcal{F}_\alpha = \{\emptyset, \Omega\}$



$\sigma(B) = \{B, B^c, \emptyset, \Omega\}$

$\sigma(A, B) = \{\emptyset, \Omega, A, B, A^c, B^c, A \cup B, (A \cup B)^c\}$

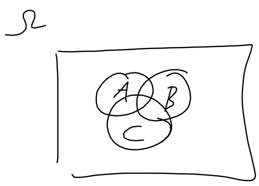


$\sigma(A,B) = \{\emptyset, \Omega, A, B, A^c, B^c, A \cup B, (A \cup B)^c, A \cup B^c, (A \cup B^c)^c, B \cup A^c, (B \cup A^c)^c, A^c \cup B^c, (A^c \cup B^c)^c, (A \cup B)^c \cup (A^c \cup B^c)^c, ((A \cup B)^c \cup (A^c \cup B^c)^c)^c\}$

$X(\omega) = \begin{cases} 1 & \omega \in B \\ -1 & \omega \in B^c \end{cases}$

$\sigma(X) = \{\emptyset, \Omega, B, B^c\}$

elements is $2^{\#\text{ distinct regions}}$



$\sigma(A, B, C)$ $\quad 2^8$ elements

256

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$$\emptyset \cap \Omega = \emptyset$$

so $\emptyset$ + Ω are disjoint

$$\mathbb{P}(\emptyset \cup \Omega) = \mathbb{P}(\emptyset) + \mathbb{P}(\Omega)$$

$$\mathbb{P}(\Omega) - \mathbb{P}(\Omega) = \mathbb{P}(\emptyset)$$

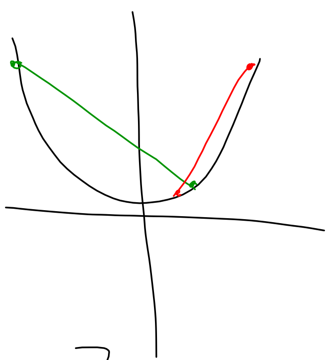
$$\mathbb{P}(\emptyset) = 0$$

Roll a 6-sided die

$\Omega = \{$⚀, ⚁, ⚂, ⚃, ⚄, ⚅$\}$

$X(\omega) = \begin{cases} 13, & \omega \in \{⚁, ⚃, ⚅\} \\ -3.7, & \omega \in \{⚀, ⚂, ⚄\} \end{cases}$

$$\varphi(x) = x^2$$



$$\varphi(E[X]) \leq E[\varphi(X)]$$

$$(E[X])^2 \leq E[X^2]$$

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