

union and intersection: operator rules

Let E_1, E_2, E_3 denote events in Ω

- Commutative

$$E_1 \cup E_2 = E_2 \cup E_1$$

$$E_1 \cap E_2 = E_2 \cap E_1$$

- Associative

$$(E_1 \cup E_2) \cup E_3 = E_1 \cup (E_2 \cup E_3)$$

$$(E_1 \cap E_2) \cap E_3 = E_1 \cap (E_2 \cap E_3)$$

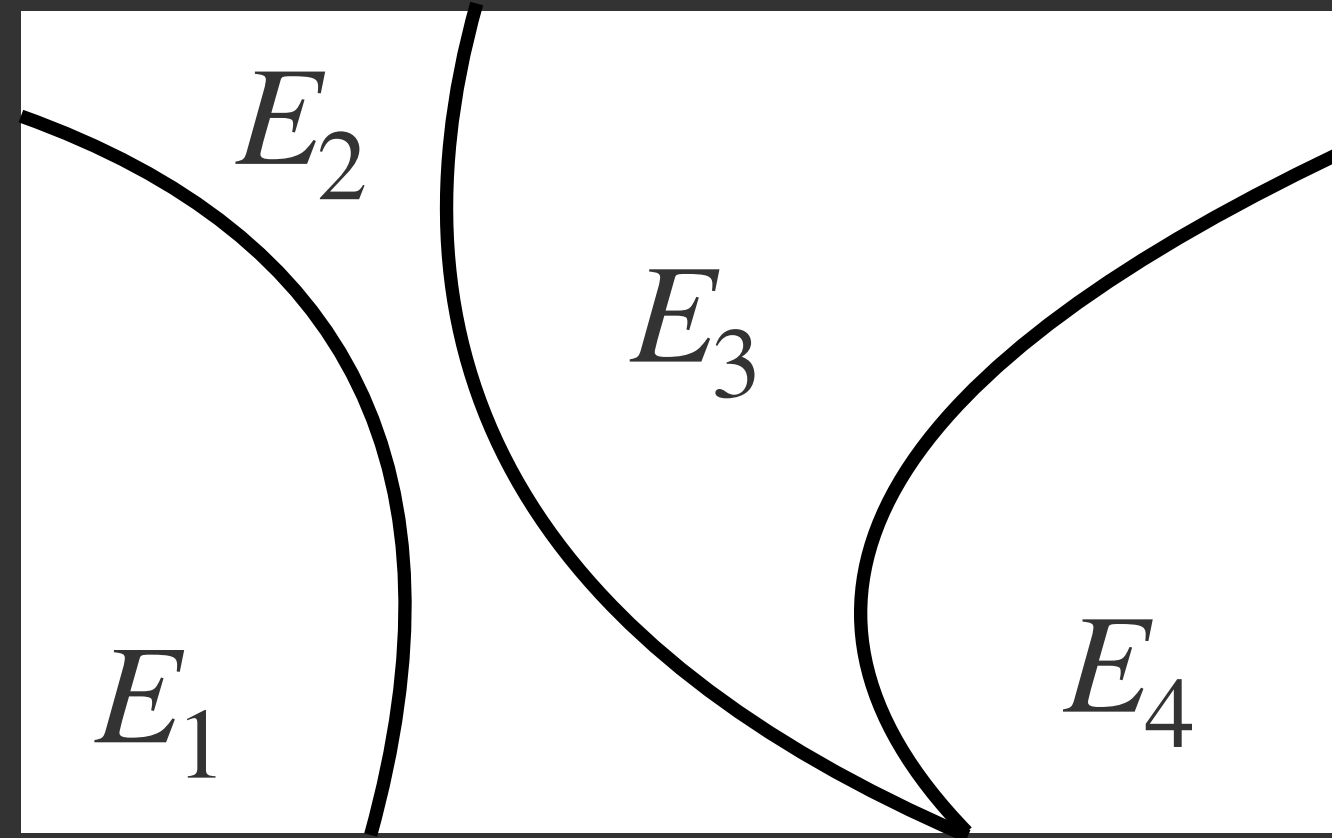
- Distributive

$$(E_1 \cup E_2) \cap E_3 = (E_1 \cap E_3) \cup (E_2 \cap E_3)$$

$$(E_1 \cap E_2) \cup E_3 = (E_1 \cup E_3) \cap (E_2 \cup E_3)$$

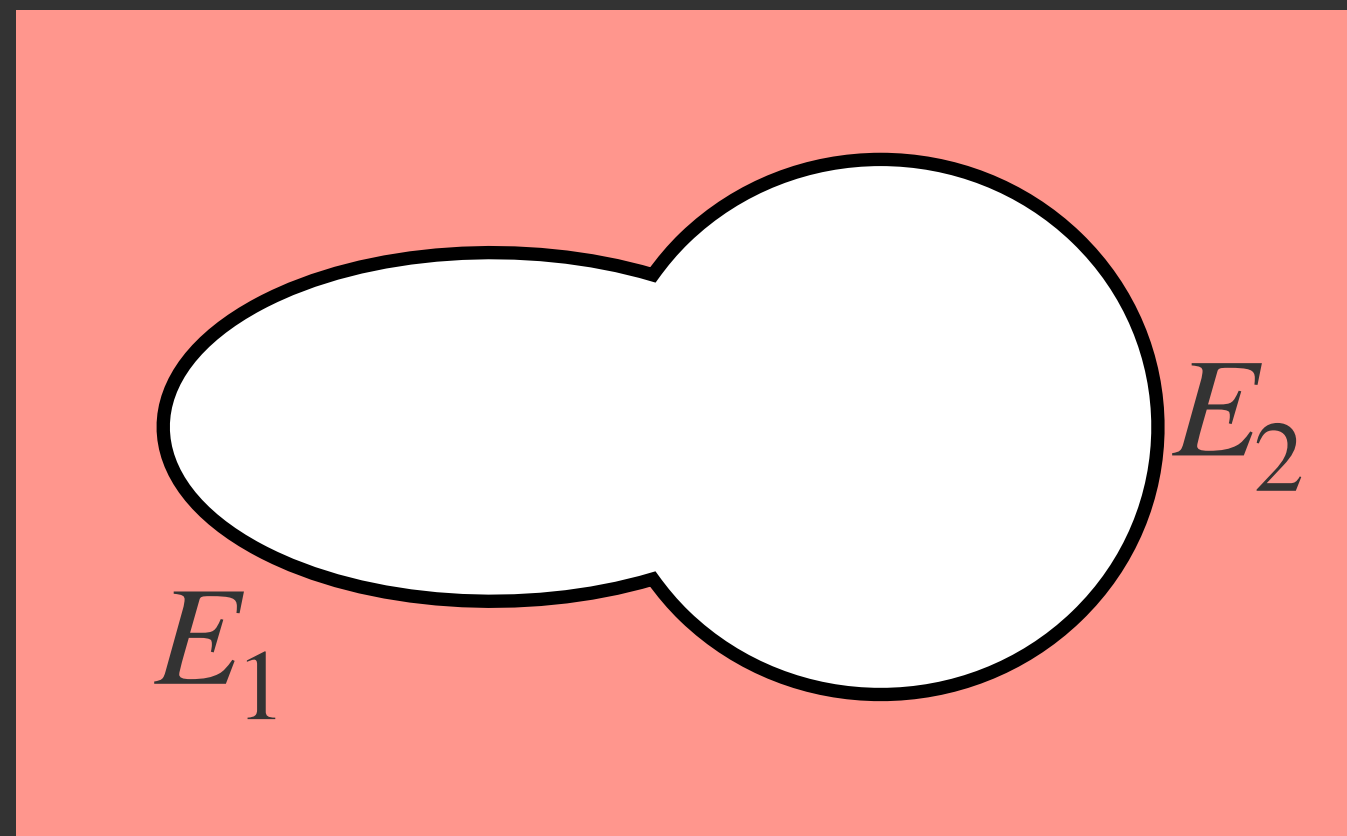
the complement

MECE = mutually exclusive and collectively exhaustive events



de Morgan's Rules

$$\overline{E_1 \cup E_2} = \overline{E_1} \cap \overline{E_2}$$



$$\overline{E_1 \cap E_2} = \overline{E_1} \cup \overline{E_2}$$

