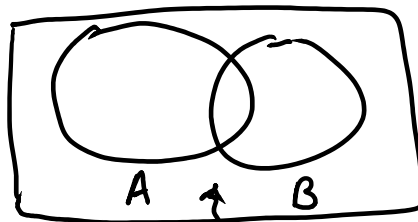


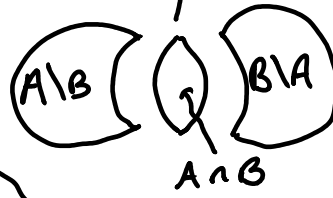
Inclusion Exclusion



$$P(A \cup B) = ??$$

$$P(A \setminus B) + P(A \cap B) + P(B \setminus A) + P(A \cap B) - P(A \cap B)$$

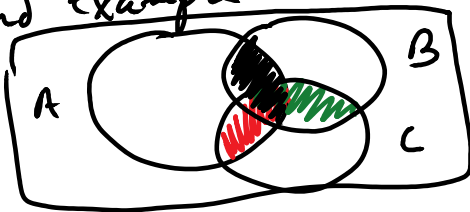
$\underbrace{\hspace{10em}}_{P(A)} \quad \underbrace{\hspace{10em}}_{P(B)}$



$$A \cup B = (A \setminus B) \cup (A \cap B) \cup (B \setminus A)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Second example: Inclusion-Exclusion



$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$