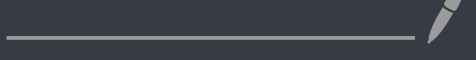
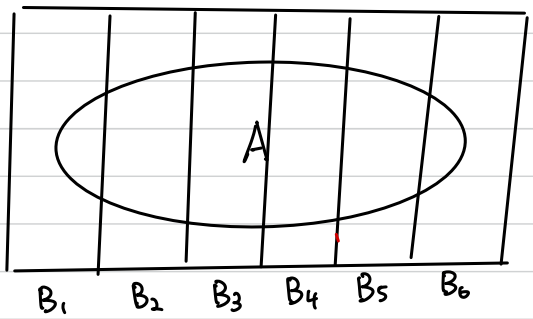


Week 5 Lecture Notes

Bayes' Theorem

$$P(B|A) = \frac{P(A|B)\,P(B)}{P(A)} = \frac{P(A|B)\,P(B)}{P(A|B)\,P(B) + P(A|\bar{B})\,P(\bar{B})}$$

Imagine we partition the sample space into $B_1, B_2, \ldots, B_n$:



Then

$$P(A) = \sum_{i=1}^{n} P(A|B_i)\,P(B_i)$$

$$P(B_K|A) = \frac{P(A|B_K)\,P(B_K)}{P(A)}$$

B_K could mean $B_1, B_2, \ldots$

$$= \frac{P(A|B_K)\,P(B_K)}{\sum_{i=1}^{n} P(A|B_i)\,P(B_i)}$$