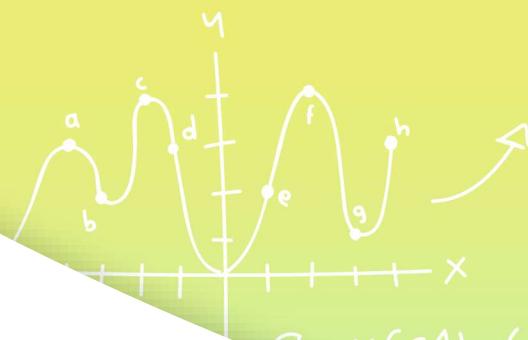


3.2

Bayes's Formula



$$e = f^2(x+4gh)^2(s) \cdot (x)^3 \div (gh)^2 - x^2$$

$$f = gh^2 + (s)(x+2h)^3 \times 4x^2(hc)^3 + x^2 - 2x^2$$

$$g = x^2 \div (x)(2x)^2 + (hfe)^2 4x^3(3h)$$

$$h = e^2 f^2 - (x)^2 + (3)^2 (f)^3 + x(4x)$$

$$dh(x) = bc$$

$$(x)^2 = ab$$

$$a = x(s^1) + (h)(c) + (d)(ef)^2 = x^2$$

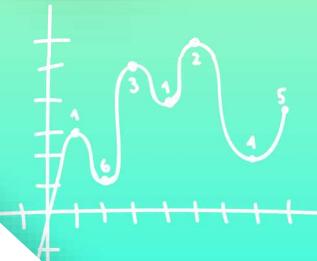
$$(h)(d) \div (s^1)(h^2)(b)^2 = \frac{4x^2 hd}{2s+4x}$$

$$\frac{4x^2 \cdot h}{2s+4x} \cdot \frac{h^2 (h)}{s^2}$$

$$ab = \frac{4x^2 + (ef)^2}{hc \cdot s^2(x)^3}$$

$$\frac{4x^2 + ab(s)^3}{(x)(s)^1}$$

$$4(sK)^3$$



$$(x)^2 = ab$$

$$dh(x) = bc$$

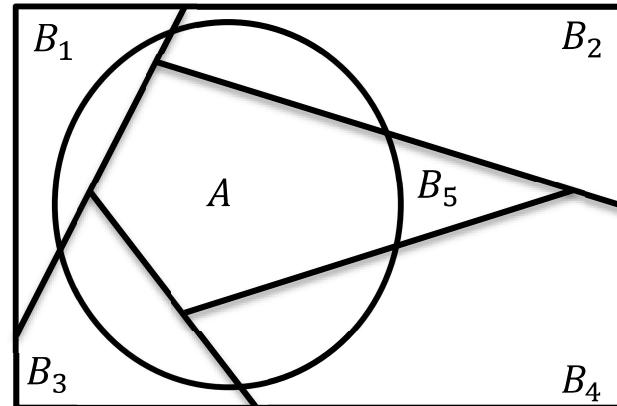
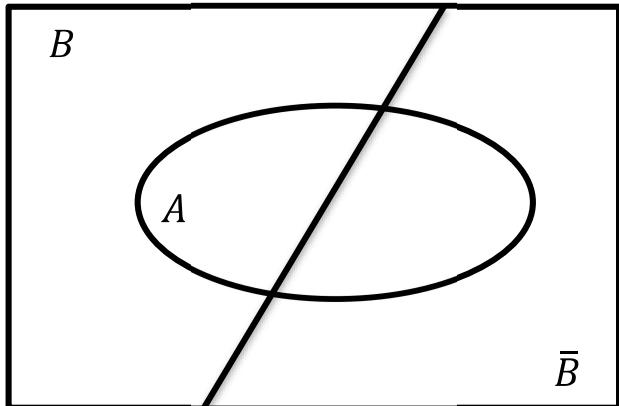
3.2. Bayes's Formula

Theorem 1 (The total probability theorem)

Let B_1, B_2, \dots, B_k be a partition of Ω , and A be an event, then:

$$P(A) = \sum_{i=1}^k P(A \cap B_i)$$

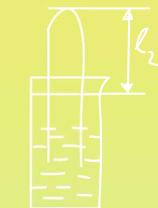
$$P(A) = P(A \cap B) + P(A \cap \bar{B})$$



$$\begin{aligned} T_1 &= \ell_1 + 273 = 273 + 60 = \\ &= 333K, T_2 = t_2 + 273 = 298K \end{aligned}$$

$$\frac{\ell_1}{\ell_1} = \frac{500}{426} = 1,17$$

$$; \Delta_1 = 0,01$$



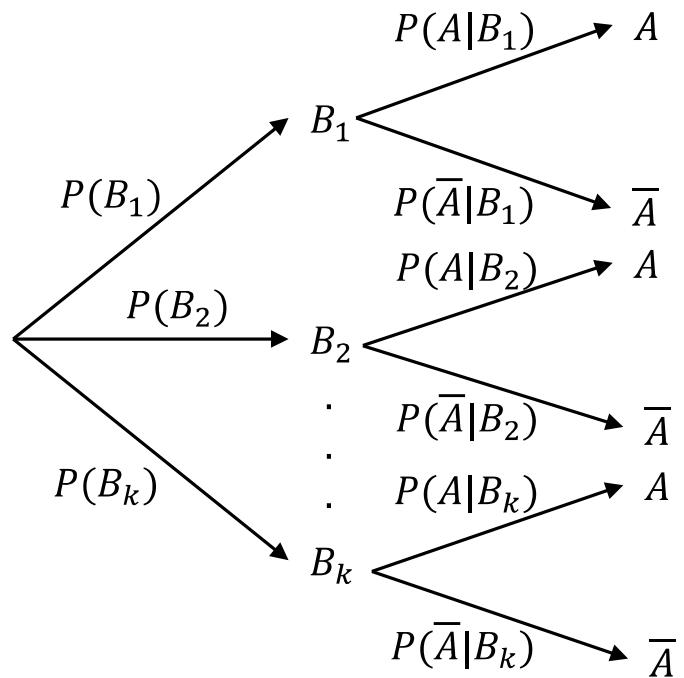
$$\begin{aligned} X &= 233 \\ &+ 233 \\ &= 327K \end{aligned}$$



$$\Delta T = \Delta T_0 + \Delta T_0 = 1 + 0,5 = 1,5K$$

$$\Delta \ell = \Delta \ell + \Delta \ell_0 = 1 + 0,5 = 1,5mm$$

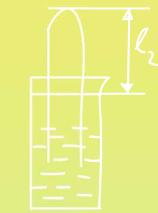
3.2. Bayes's Formula



$$T_1 = \ell_1 + 273 = 273 + 60 = 333K, T_2 = \ell_2 + 273 = 298K$$

$$\frac{\ell_1}{\ell_2} = \frac{500}{426} = 1,17$$

$$1; \Delta_1 = 0,01$$



$$X \\ 233 \\ 233 \\ 233 \\ 233 \\ = 327K$$

$$\Delta T = \Delta T_o + \Delta T_0 = 1 + 0,5 = 1,5K$$

$$\Delta \ell = \Delta \ell + \Delta \ell_0 = 1 + 0,5 = 1,5mm$$



3.2. Bayes's Formula

Let A and B be two integers, then:

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow P(A \cap B) = P(A|B)P(B)$$

Bayes's Formula

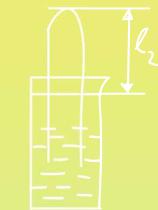
Let B_1, B_2, \dots, B_k be a partition of Ω , and A be an event, then:

$$P(A) = \sum_{i=1}^k P(A \cap B_i) \sum_{i=1}^k P(A|B_i)P(B_i)$$

$$\begin{aligned} T_1 &= \ell_1 + 273 = 273 + 60 = \\ &= 333K, T_2 = t_2 + 273 = 298K \end{aligned}$$

$$\ell_1 = \frac{500}{426} = 1,17$$

$$; \Delta_1 = 0,01$$



$$\begin{aligned} X &= 233 \\ 4+273 &= 327K \end{aligned}$$

$$\Delta\ell = \Delta\ell + \Delta\ell_0 = 1 + 0,5 = 1,5mm$$

$$\Delta T = \Delta T_0 + \Delta T_0 = 1 + 0,5 = 1,5K$$



3.2. Bayes's Formula

Example 5

An insurance company believes that people can be divided into two classes: those who are accident prone and those who are not. The company's statistics show that an accident-prone person will have an accident at some time within a fixed 1-year period with probability 0.4, whereas this probability decreases to 0.2 for a person who is not accident prone. Assume that 30 percent of the population is accident prone

- What is the probability that a new policyholder will have an accident within a year of purchasing a policy?
- Suppose that a new policyholder has an accident within a year of purchasing a policy. What is the probability that he or she is accident prone?

$$T_1 = \ell_1 + 273 = 273 + 60 = 333K, T_2 = \ell_2 + 273 = 298K$$

$$\ell_1 = \frac{500}{426} = 1,17$$

$$; \Delta_1 = 0,01$$



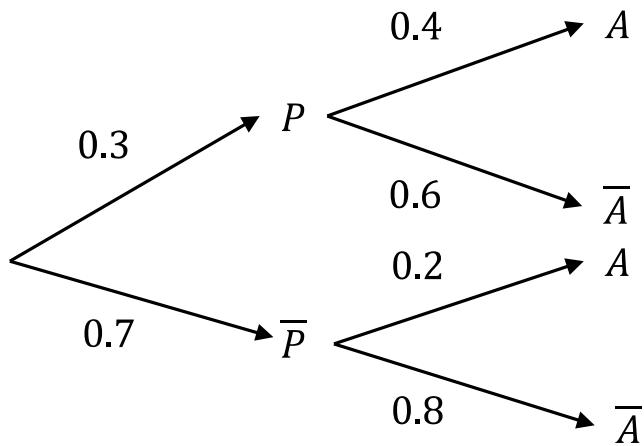
$$\Delta T = \Delta T_n + \Delta T_o = 1 + 0,5 = 1,5K \quad \Delta \ell = \Delta \ell + \Delta \ell_o = 1 + 0,5 = 1,5mm$$

3.2. Bayes's Formula

Solution

i. $P(A) = P(A \cap P) + P(A \cap \bar{P}) = P(A|P)P(P) + P(A|\bar{P})P(\bar{P}) = 0.4 \times 0.3 + 0.2 \times 0.7 = 0.26$

ii. $P(P|A) = \frac{P(P \cap A)}{P(A)} = \frac{0.12}{0.26} = \frac{6}{13}$



$$\begin{aligned} T_1 &= \ell_1 + 273 = 273 + 60 = \\ &= 333K, T_2 = t_2 + 273 = 298K \end{aligned}$$

$$\ell_1 = \frac{500}{426} = 1,17$$

$$; \Delta_1 = 0,01$$



$$\begin{aligned} X &= 233 \\ &+ 233 \\ &= 327K \end{aligned}$$



$$\Delta T = \Delta T_0 + \Delta T_0 = 1 + 0,5 = 1,5K$$

$$\Delta \ell = \Delta \ell + \Delta \ell_0 = 1 + 0,5 = 1,5mm$$