(1) D: produto defeituoso

F_1: produto produzido pela fábrica 1
F_2: " " " 2
F_3: " " " 3

$$\begin{cases} P(F_1) = 30\% \\ P(F_2) = 45\% \\ P(F_3) = 25\% \end{cases} \qquad \begin{cases} P(D|F_1) = 1\% \\ P(D|F_2) = 2\% \\ P(D|F_3) = 1{,}5\% \end{cases}$$

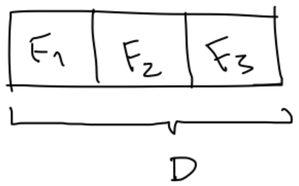
(a) $P(D) = \underset{①}{P(D \cap F_1)} + \underset{②}{P(D \cap F_2)} + \underset{③}{P(D \cap F_3)}$

$$P(D) = \underbrace{P(D|F_1) \cdot P(F_1)}_{①} + \underbrace{P(D|F_2) \cdot P(F_2)}_{②} + \underbrace{P(D|F_3) \cdot P(F_3)}_{③}$$

$$P(D) = (0{,}01 \times 0{,}3) + (0{,}02 \times 0{,}45) + (0{,}015 \times 0{,}25)$$

$$P(D) \simeq 0{,}01575 \Rightarrow \boxed{P(D) \simeq 1{,}575\%}$$

$D: (D \cap F_1) \cup (D \cap F_2) \cup (D \cap F_3)$



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

(b) $P(F_2 | D) = \frac{P(F_2 \cap D)}{P(D)} = \frac{P(D|F_2) \cdot P(F_2)}{1,575\%} = \frac{(0,02 \times 0,45)}{0,01575}$

$P(D|F_2) = X$

$P(F_2|D) = 57,14\ \%$

$\Omega = \{ ccccc, cccck, cccckk, \ldots, kkkkk \}$

$$p = \frac{1}{n(\Omega)}$$

X: qnt. de "cara" obtidas nos 5 lançamentos

$X \in [0, 5]$

$P(X = 0) = ?$ $P(X = 1) = ?$

$P(z = 5)$

$P(z = 10)$

$P(X = x)$

$$X = \{1, 2, 3, 4, 5\}$$

$$P = \{0{,}2; 0{,}2; 0{,}2; 0{,}2; 0{,}2\}$$

$$E(X) = \sum_{i=1}^{5} x_i \cdot p(x_i) =$$

$$\mu = \frac{1}{N} \sum_{i=1}^{N} x_i$$

$$\sum x_i = \frac{15}{5} = 3$$

$$\sigma^2 = \sum_{i=1}^{N} \frac{(x_i - \mu)^2}{N}$$

$$Var(X) = \sum_{i} (x_i - E(X))^2 \times p(x_i)$$

Exemplo

X: qnt. de caras em 3 lançamentos

$\Omega = \{ccc, cck, ckc, ckk, kcc, kck, kkc, kkk\}$

$X \in [0, 3]$

$P(X=0) = 1/8$

$P(X=1) = 3/8$

$P(X=2) = 3/8$

$P(X=3) = 1/8$

$\longrightarrow E(X) = \sum_i X_i \cdot p(X_i) = \left(\frac{1}{8} \times 0\right) + \left(1 \times \frac{3}{8}\right) + \left(2 \times \frac{3}{8}\right) + \left(3 \times \frac{1}{8}\right)$

$= \frac{3}{8} + \frac{6}{8} + \frac{3}{8} = \frac{12}{8} = \frac{3}{2} = 1{,}5$

$\frac{0+1+2+3}{4} = \frac{6}{4} = \frac{3}{2}$