Événements indépendants

Ex 16 : $P(A \cap B) = P(A) \times P(B)$

$= 0,3 \times 0,5 = 0,15$

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

$= 0,3 + 0,5 - 0,15 = 0,65$

Ex 17 :

$P(A) = \frac{1}{3}$ $\quad P(A \cup B) = \frac{1}{2}$ $\quad P(B) = \alpha$

a) $\underbrace{P(A \cap B) = 0}_{\text{incompatibles}} \Rightarrow P(A \cup B) = P(A) + P(B)$

$\frac{1}{2} = \frac{1}{3} + \alpha$

$\Rightarrow \alpha = \frac{1}{2} - \frac{1}{3} = \frac{3-2}{6} = \frac{1}{6}$

$P(A) \times P(B) = \frac{1}{3} \times \frac{1}{6} = \frac{1}{18} \neq 0$

A et B ne sont pas indépendants

b) $P(A \cap B) = P(A) \times P(B) = \frac{\alpha}{3}$

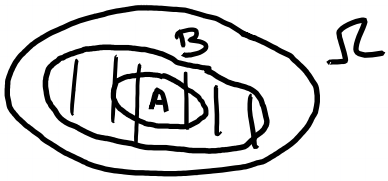
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\frac{1}{2} = \frac{1}{3} + \alpha - \frac{\alpha}{3}$$

$$\alpha - \frac{\alpha}{3} = \frac{1}{2} - \frac{1}{3}$$

$$\frac{2}{3}\alpha = \frac{1}{6} \Rightarrow \alpha = \frac{1}{6} \times \frac{3}{2} = \frac{3}{12} = \frac{1}{4}$$

c) $A \subset B$



$$P(A \cup B) = P(B) \Rightarrow \alpha = \frac{1}{2}$$

$$P(A \cap B) = P(A)$$

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

Ex 18 :

$$P(A) = \frac{8}{32} = \frac{1}{4} = P(B)$$

$$P(C) = \frac{4}{32} = \frac{1}{8}$$

$P(A \cap B) = 0$ donc A et B sont incompatibles ($A \cap B = \phi$)

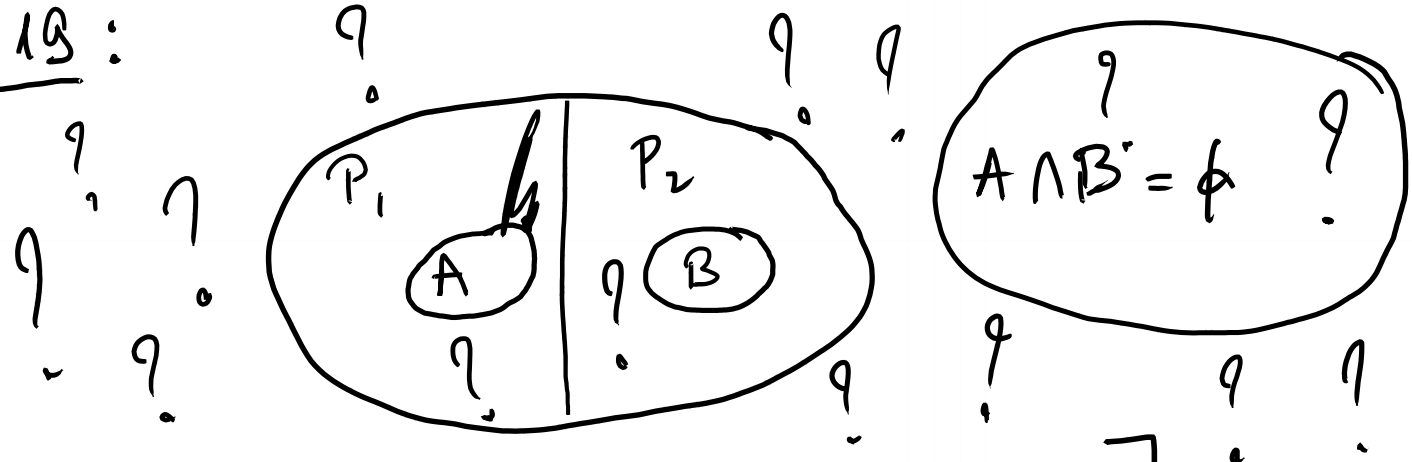
$$P(A \cap C) = \frac{1}{32} \qquad P(A) \times P(C) = \frac{1}{4} \times \frac{1}{8} = \frac{1}{32}$$

donc A et C sont indépendants.

$$P(B \cap C) = \frac{1}{32} \qquad P(B) \times P(C) = \frac{1}{4} \times \frac{1}{8} = \frac{1}{32}$$

donc B et C sont Indépendants.

Ex 19 :



a) $P(A \cap B) = 0,03 \times 0,07 = 0,0021$

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

$= 0,03 + 0,07 - 0,0021$

$= 0,0979$

c) $P(\overline{A \cup B}) = 1 - P(A \cup B) = 0,9021$