19/20

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Pappatis 1H

Interro. Maths.

16/03/15

Exercice 1.

- $P(A\cap B) = P(A) + P(B) - P(A\cup B) = \frac{2}{3} + \frac{1}{5} - \frac{4}{5}$

$= \frac{10}{15} + \frac{3}{15} - \frac{12}{15} = \frac{1}{15}$

- $P(A\cap \bar{B})$

$P(A) - P(A\cap B) = \frac{2}{3} - \frac{1}{15} = \boxed{\frac{9}{15}}$

$\cancel{P(\bar{B}) = 1 - P(B) = \frac{4}{5}}$

$\cancel{P(A\cap \bar{B}) = \frac{2}{3} + \frac{4}{5} - \frac{4}{5} = \frac{2}{3}}$

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

$= \frac{2}{3} + \frac{4}{5} - \cancel{\frac{2}{3}}\,\frac{9}{15} = \cancel{\frac{4}{5}}\,\frac{13}{15}$

- $P(\bar{A}\cap \bar{B})$

$P(\bar{A}) = \frac{1}{3}$

$P(\bar{A}\cap \bar{B}) = 1 - P(A\cup B) = \frac{1}{5}$

- $P(\bar{A}\cap B) = P(B) - P(A\cap B) = \frac{1}{5} - \frac{1}{15} = \frac{2}{15}$

$P(A\Delta B) = P(A\cup B) - P(A\cap B) = \frac{4}{5} - \frac{1}{15} = \frac{11}{15}$

Exercice 2.

1. $\sum_{k=1}^{6} c \cdot k = 1$

$\Leftrightarrow \quad 21 \cdot c = 1$

$\Leftrightarrow \quad c = \frac{1}{21}$

2. $P(A) = \frac{1}{21} + \frac{2}{21} = \frac{3}{21} = \frac{1}{7}$

$P(B) = \frac{1+6}{21} = \frac{7}{21} = \frac{1}{3}$

$P(A \cap B) = P(\{1\}) = \frac{1}{21} = P(A) \times P(B)$

Donc les deux evenements sont independants.

3. $P_{A \cup B}(A) = \frac{P(A \cap (A \cup B))}{P(A \cup B)}$.

$P(A \cup B) = P(\{1, 2, 6\}) = \frac{9}{21}$

$P(A \cap (A \cup B)) = P(A) = \frac{1}{7}$

$P_{A \cup B}(A) = \frac{\frac{1}{7}}{\frac{9}{21}} = \frac{1}{7} \cdot \frac{21}{9} = \frac{21}{63} = \frac{7}{21} = \frac{1}{3}$

$P_{A \cup B}(B) = \frac{\frac{1}{3}}{\frac{9}{21}} = \frac{1}{3} \cdot \frac{21}{9} = \frac{21}{27} = \frac{7}{9}$

Ils ne sont pas independant car:

$P_{A \cup B}(A) \neq P(A)$ (et $P_{A \cup B}(B) \neq P(B)$)

4. • $P_A(A \cup B) = \dfrac{P((A \cup B) \cap P(A))}{P(A)} = 1.$ /

• $P_A(\bar{A} \cap \bar{B}) = \dfrac{P(\bar{A} \cap \bar{B}) \cap A)}{P(A)} = 0$ /

• $P_A(A) = 1.$ /

• $P_A(B) = \dfrac{P(B \cap A)}{P(A)} = \dfrac{P(\{1\})}{P(A)} = \dfrac{\frac{1}{21}}{\frac{1}{7}}$

$= \dfrac{1}{21} \times \dfrac{7}{1} = \dfrac{7}{21} = \dfrac{1}{3}.$ /

• $P_A(A \cap B) = \dfrac{P((A \cap B) \cap A)}{P(A)} = \dfrac{P(A \cap B)}{P(A)}$

$= \dfrac{\frac{1}{21}}{\frac{1}{7}} = \dfrac{1}{3}.$ /

Exercice 3.

1. Les événements A_1 sont indépendants donc
$P(A_1 \cap A_2) = P(A_1) \times P(A_2)$ or $P(A_1)$ et $P(A_2)$
ne sont pas nuls, par conséquent les ensembles
ne sont pas disjoints et donc pas incompatibles.

TB / oui mais il y a plus simple !

2. $P(A_1 \cap A_2) = P(A_1) \times P(A_2) = \dfrac{1}{3} \times \cancel{\dfrac{2}{3}} \times \dfrac{1}{3}$

$= \cancel{\dfrac{2}{27}}\ \dfrac{1}{9}$ /

$P(A_1 \cup A_2) = \dfrac{1}{3} + \cancel{\dfrac{2}{3}} \times \dfrac{1}{3} - \dfrac{1}{9}\ \cancel{\dfrac{2}{27}} = \dfrac{1}{3} + \cancel{\dfrac{2}{3}}\ \dfrac{1}{3} - \cancel{\dfrac{2}{27}}$

$\dfrac{1}{9}$

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$$\frac{2}{3} - \frac{1}{9} = \frac{6}{9} - \frac{1}{9} = \frac{5}{9}$$

$$= \frac{5}{9} - \frac{2}{27} = \frac{15}{27} - \frac{2}{27} = \frac{13}{27}$$

3. $\cancel{P(A_m \cap \ldots \cap A_{m+n}) = \left(\frac{2}{3}\right)^{m+n-1} \times \frac{1}{3} - \left(\frac{2}{3}\right)^m}$

Correction: $P(A_m) - P(B_{m+n}) = \left(\frac{1}{3}\right)^{n+1}$