

## Correction de l'épreuve de Probabilités

### Exercice 1: (02 Pts)

a/  $N_1 = P_6(2,3,1) * P_3(1,2) = \frac{6!}{2!3!1!} * \frac{3!}{1!2!} = 180 \text{ numéros.}$  (01)

b/  $N_2 = P_4(2,1,1) * P_2(1,1) = \frac{4!}{2!1!1!} * 2 = 24 \text{ numéros.}$  (01)

### Exercice 2: (03,75 Pts)

$P(A \cup B) = P(A) + P(B) - P(A \cap B).$  (0,25)

1) A et B incompatibles  $\Leftrightarrow A \cap B = \emptyset$  i.e.  $P(A \cap B) = 0.$  (0,5)

$P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{4} = \frac{3}{4} = 0,75$  (0,5)

2) A et B indépendants  $\Leftrightarrow P(A \cap B) = P(A) \cdot P(B)$  (0,5)

$P(A \cup B) = P(A) + P(B) - P(A) \cdot P(B) = \frac{1}{2} + \frac{1}{4} - \frac{1}{8} = \frac{3}{4} - \frac{1}{8} = \frac{5}{8} = 0,625$  (0,5)

3)  $A \subseteq B \Leftrightarrow A \cap B = A$  i.e.  $P(A \cap B) = P(A)$  (0,5)

$P(A \cup B) = P(A) + P(B) - P(A) = P(B) = \frac{1}{4} = 0,25$  (0,5)

4)  $P(A \cap B) = \frac{1}{5}.$

$P(A \cup B) = \frac{1}{2} + \frac{1}{4} - \frac{1}{5} = \frac{3}{4} - \frac{1}{5} = \frac{15-4}{20} = \frac{11}{20} = 0,55$  (0,5)

### Exercice 3: (02,5 Pts)

Soient les événements suivants :  $G_1$ : "l'étudiant appartient au groupe 1".  
 $G_2$ : "l'étudiant appartient au groupe 2".  
 $A$ : "l'étudiant est admis".

1)  $P(G_1) = \frac{\text{Card}(G_1)}{\text{Card}(\Omega)} = \frac{24}{24+28} = \frac{24}{52} = \frac{6}{13} = 0,46.$  (0,5)

$$2) P(G_2) = \frac{\text{Card}(G_2)}{\text{Card}(\Omega)} = \frac{28}{24+28} = \frac{28}{52} = \frac{7}{13} = 0.54 \quad (0,5)$$

$$3) P(A) = P(A/G_1) \cdot P(G_1) + P(A/G_2) \cdot P(G_2) = \frac{20}{24} \times 0.46 + \frac{14}{28} \times 0.54$$

$$= (0.83 \times 0.46) + (0.5 \times 0.54) = 0.38 + 0.27 = 0.65 \quad (0,5)$$

$$4) P(G_1/A) = \frac{P(A/G_1) \cdot P(G_1)}{P(A)} = \frac{(0.83 \times 0.46)}{0.65} = \frac{0.38}{0.65} = 0.58 \quad (0,5)$$

Exercice 4: (03,75 Pts)

$$1) P(A) = \frac{5}{100} = 0.05 \quad (0,25)$$

$$P(D/A) = \frac{60}{100} = 0.6 \quad (0,25)$$

$$P(\bar{D}/\bar{A}) = \frac{98}{100} = 0.98 \quad (0,25)$$

$$P(\bar{A}) = 1 - P(A) = 0.95 \quad (0,25)$$

$$P(\bar{D}/A) = 1 - P(D/A) = 0.4 \quad (0,25)$$

$$P(D/\bar{A}) = 1 - P(\bar{D}/\bar{A}) = 0.02 \quad (0,25)$$

$$2) P(D) = P(D \cap A) + P(D \cap \bar{A}) = P(D/A) \cdot P(A) + P(D/\bar{A}) \cdot P(\bar{A})$$

$$= (0.05 \times 0.6) + (0.95 \times 0.02) = 0.049 \quad (0,5)$$

$$3) P(A/D) = \frac{P(A \cap D)}{P(D)} = \frac{P(D/A) \cdot P(A)}{P(D)} = \frac{(0.05 \times 0.6)}{0.049} = \frac{0.03}{0.049} = \frac{30}{49} = 0.61 \quad (0,5)$$

\* Remarque: pour les formules; (0,25 Pts)