

Statistiques: Série 11

Corrigé

Exercice 1. Soit X la variable aléatoire qui dénombre le nombre de filles.

$$\text{a) } P(X = 4) = C_6^4 \cdot \left(\frac{1}{2}\right)^4 \cdot \left(\frac{1}{2}\right)^2 = 23,4375\%.$$

$$\text{b) } P(X \geq 1) = 1 - P(X = 0) = 1 - C_6^0 \cdot \left(\frac{1}{2}\right)^0 \cdot \left(\frac{1}{2}\right)^6 = 98,4375\%.$$

Exercice 2.

$$\text{a) } P(X = 4) = C_8^4 \cdot \left(\frac{19}{20}\right)^4 \cdot \left(\frac{1}{20}\right)^4 \cong 0,0356\%.$$

$$\text{b) } P(X \geq 2) = 1 - P(X = 0) - P(X = 1) = 1 - C_5^0 \cdot \left(\frac{19}{20}\right)^0 \cdot \left(\frac{1}{20}\right)^5 - C_5^1 \cdot \left(\frac{19}{20}\right)^1 \cdot \left(\frac{1}{20}\right)^4 = 99,997\%.$$

Exercice 3.

$$\text{a) } P(X = 5) = C_8^5 \cdot (60\%)^5 \cdot (40\%)^3 = 27,869\%.$$

$$\text{b) } P(X \geq 1) = 1 - P(X = 0) = 1 - C_8^0 \cdot (60\%)^0 \cdot (40\%)^8 = 99,934\%.$$

c) On pose $P(X \geq 1) = 95\%$:

$$\begin{aligned} 1 - P(X = 0) &= 95\% \\ 1 - C_n^0 \cdot (60\%)^0 \cdot (40\%)^n &= 95\% \\ 1 - (40\%)^n &= 95\% \\ -(40\%)^n &= -5\% \\ (40\%)^n &= 5\% \\ \log((40\%)^n) &= \log(5\%) \\ n \cdot \log((40\%)) &= \log(5\%) \\ n &= \frac{\log(5\%)}{\log((40\%))} \\ n &\cong 3,264. \end{aligned}$$

Ainsi, il devra tirer au moins 4 flèches.

Exercice 4. On pose $P(X \geq 1) = 80\%$:

$$\begin{aligned} 1 - P(X = 0) &= 80\% \\ 1 - C_n^0 \cdot (30\%)^0 \cdot (70\%)^n &= 80\% \\ 1 - (70\%)^n &= 80\% \\ -(70\%)^n &= -20\% \\ (70\%)^n &= 20\% \\ \log((70\%)^n) &= \log(20\%) \\ n \cdot \log(70\%) &= \log(20\%) \\ n &= \frac{\log(20\%)}{\log(70\%)} \\ n &\cong 4,81. \end{aligned}$$

Il devra donc réaliser au moins 5 placements.