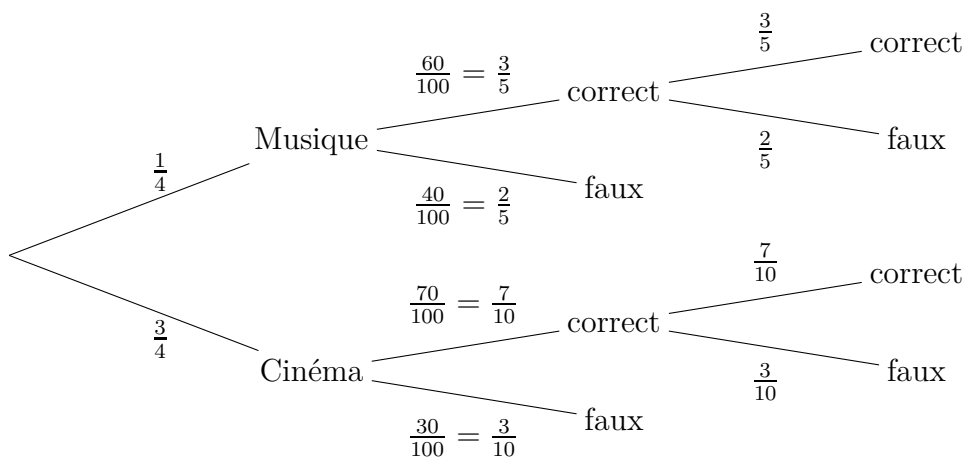


Chamblandes 2012 — Problème 6



a) $\frac{1}{4} \cdot \frac{3}{5} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{7}{10} \cdot \frac{7}{10} = \frac{9}{100} + \frac{147}{400} = \frac{183}{400}$

b) $\frac{\frac{1}{4} \cdot \frac{3}{5} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{7}{10} \cdot \frac{7}{10}}{\frac{1}{4} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{7}{10}} = \frac{\frac{9}{100} + \frac{147}{400}}{\frac{3}{20} + \frac{21}{40}} = \frac{\frac{183}{400}}{\frac{27}{40}} = \frac{61}{90}$

c) $\frac{\frac{1}{4} \cdot \frac{3}{5} \cdot \frac{3}{5}}{\frac{1}{4} \cdot \frac{3}{5} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{7}{10} \cdot \frac{7}{10}} = \frac{\frac{9}{100}}{\frac{9}{100} + \frac{147}{400}} = \frac{\frac{9}{100}}{\frac{183}{400}} = \frac{12}{61}$

Les deux dernières questions relèvent d'une loi binomiale.

La probabilité qu'un jour Julien ne réponde pas correctement à la première question vaut $\frac{1}{4} \cdot \frac{2}{5} + \frac{3}{4} \cdot \frac{3}{10} = \frac{1}{10} + \frac{9}{40} = \frac{13}{40}$.

d) $C_3^5 \left(\frac{13}{40}\right)^3 \left(\frac{27}{40}\right)^2 = 10 \cdot \frac{2197}{64\,000} \cdot \frac{729}{1600} = \frac{1\,601\,613}{10\,240\,000} \approx 15,64\%$

e) $1 - C_0^5 \left(\frac{13}{40}\right)^0 \left(\frac{27}{40}\right)^5 = 1 - 1 \cdot 1 \cdot \frac{14\,348\,907}{102\,400\,000} = \frac{88\,051\,093}{102\,400\,000} \approx 85,99\%$