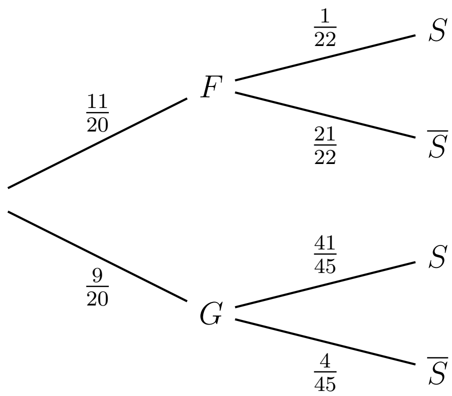
On peut dresser un arbre pondéré :



1.

$$p(G) = 1 - p(F) = 1 - \frac{110}{110+90} = 1 - \frac{110}{200} = \frac{90}{200} = \frac{9}{20};$$

$$p(G \cap \overline{S}) = p(G) \times p_G(\overline{S}) = \frac{9}{20} \times \frac{4}{45} = \frac{9 \times 4}{4 \times 5 \times 5 \times 9} = \frac{1}{25};$$

De même :

$$p(F \cap \overline{S}) = p(F) \times p_F(\overline{S}) = \frac{11}{20} \times \frac{1}{22} = \frac{11 \times 1}{4 \times 5 \times 2 \times 11} = \frac{1}{40}.$$

D'après la loi des probabilités totales :

$$p(\overline{S}) = p(F \cap \overline{S}) + p(G \cap \overline{S}) = \frac{1}{40} + \frac{1}{25} = \frac{5}{200} + \frac{8}{200} = \frac{13}{200}.$$

2.

On a :

$$p_{\overline{S}}(G) = \frac{p(\overline{S} \cap G)}{p(\overline{S})} = \frac{p(G \cap \overline{S})}{p(\overline{S})} = \frac{\frac{9}{20} \times \frac{4}{45}}{\frac{13}{200}} = \frac{\frac{1}{25}}{\frac{13}{200}} = \frac{8}{13}.$$

3.

On a :

$$p(G \cap S) = 1 - p(G \cap \overline{S}) = 1 - \frac{1}{25} = \frac{24}{25},$$

et :

$$p(G) \times p(S) = \frac{9}{20} \times \frac{187}{200} = \frac{90}{187},$$

donc :

$p(G \cap S) \neq p(G) \times p(S)$: les événements G et S ne sont pas indépendants.