4.2.7

$$p = \frac{C_2^9 + C_2^4 + C_2^n}{C_2^{n+13}} = \frac{36 + 6 + \frac{n(n-1)}{2}}{\frac{(n+13)(n+12)}{2}} = \frac{n^2 - n + 84}{n^2 + 25n + 156} = \frac{7}{18}$$

$$\Rightarrow \quad 18n^2 - 18n + 1\,512 = 7n^2 + 175n + 1\,092 \quad \Rightarrow \quad 11n^2 - 193n + 420 = 0$$

$$\Rightarrow \quad (11n - 28)(n - 15) = 0$$

$\Rightarrow$ $n = 15$ boules noires ($\frac{28}{11}$ sol. à élim. car $\notin \mathbb{N}$)