(1) Any place in the line is equally likely to win.

\[ C = \text{Correct key} \quad I = \text{Incorrect key} \]

\[ P(1 \text{st and 2nd and 3rd}) = \frac{5}{6} \times \frac{4}{5} \times \frac{1}{4} = \frac{1}{6} \]

(2)

\begin{align*}
P(\text{DD}) &= 0.10 & P(\text{Dd}) &= 0.70 & P(\text{dd}) &= 0.20 \\
P(\text{Red} | \text{DD}) &= 1.00 & P(\text{Red} | \text{Dd}) &= 0.75 & P(\text{Red} | \text{DD}) &= 0
\end{align*}

\[ P(\text{red}) = \text{weighted average of } P(\text{red} | \text{DD}), P(\text{red} | \text{Dd}), P(\text{red} | \text{dd}) \]

\[ P(\text{red}) = P(\text{red} | \text{DD}) \times P(\text{DD}) + P(\text{red} | \text{Dd}) \times P(\text{Dd}) + P(\text{red} | \text{dd}) \times P(\text{dd}) \]

\[ P(\text{Dd} | \text{red}) = \frac{P(\text{Dd and red})}{P(\text{red})} = \frac{P(\text{Dd}) \cdot P(\text{red} | \text{Dd})}{P(\text{red})} \]