My solutions to

Deep Learning: Foundations and Concepts

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2 Probabilities

2.1

$$
\begin{aligned}
p(C=1|T=1) &= \frac{p(T=1|C=1)p(C=1)}{p(T=1)} && \text{Bayes' theorem} \\
&= \frac{p(T=1|C=1)p(C=1)}{p(T=1,C=0)+p(T=1,C=1)} && \text{sum rule} \\
&= \frac{p(T=1|C=1)p(C=1)}{p(T=1|C=0)p(C=0)+p(T=1|C=1)p(C=1)} && \text{product rule} \\
&= \frac{0.9 \cdot 0.001}{0.03 \cdot (1-0.001)+0.9 \cdot 0.001} \\
&\approx 0.029
\end{aligned}
$$