Athenian Taxi

Reference: A. Tversky and Daniel Kahneman.

1. 85% of the cabs in the city are green, and 15% are blue. A witness identified the cab as blue.

2. ... The witness correctly identified each one of the two colors 80% of the time and failed 20% of the time.

What is the probability that the cab involved in the accident was blue?
"Bayes rule" is a synonym for prior probability of variable w/out parents.

\[
P(c) = (0.15, 0.85)
\]

\[
P(A | c) = \begin{pmatrix}
  a & b \\
  g & a
\end{pmatrix} = \begin{pmatrix}
  0.2 & 0.8 \\
  0.8 & 0.2
\end{pmatrix}
\]

\[
P(c = b | A = b) = ?
\]
\[ P(A, C) = P(C) \times P(A | C) = \begin{pmatrix} a \times b \\ c \end{pmatrix} = \begin{pmatrix} 0.8 \times 1.5 = 1.2 \\ 0.3 \end{pmatrix} \]

\[ P(A, C, E) = P(A, C) \times E = \begin{pmatrix} a_3 \\ c \end{pmatrix} = \begin{pmatrix} 0.12 \\ 0 \end{pmatrix} \]

\[ P(C | A = b) = \text{normalized version of } P(A, C, E) = \]

\[ = \begin{pmatrix} 0.12 \\ 0 \end{pmatrix} \div \begin{pmatrix} 0.12 \\ 0.587 \end{pmatrix} \]

\[ P(C = b | A = a) \]