\[ P(X) = \begin{cases} 1 & -0.5 \\ 0 & 0.5 \end{cases} \]

\[ P(Y) = \begin{cases} 1 & -0.5 \\ 0 & 0.5 \end{cases} \]

\[ P(Z) = \begin{cases} 1 & 0.5 \\ 0 & 0.5 \end{cases} \]

\[ P(C_1 | X, Y) \]

\[ P(C_2 | X, Y) \]

\[ \begin{array}{c|c|c}
    x \& y & P(C_1 | x, y) \\
    \hline
    00 & 0 & 1 \\
    00 & 1 & 0 \\
    01 & 0 & 1 \\
    01 & 1 & 0 \\
    10 & 0 & 1 \\
    10 & 1 & 0 \\
    11 & 0 & 1 \\
    11 & 1 & 0 \\
\end{array} \]

\[ \begin{array}{c|c|c}
    C_1 \& C_2 \& P(C_1, C_2) \\
    \hline
    0 \& 0 & 0 \\
    0 \& 1 & 1 \\
    1 \& 0 & 0 \\
    1 \& 1 & 1 \\
\end{array} \]

\[ P(C_1 = 1 | 00) = 1 \]

\[ P(C_1 = 0 | 00) = 0 \]

\[ P(C_1 = 1 | 10) = 0 \]

\[ P(C_1 = 0 | 10) = 1 \]
\[ P(x, y, z, c_1, c_2) = \]

\[ P(x) \cdot P(y|x) \cdot P(z|x, y) \cdot P(c_1 | x, y, z) \cdot P(c_2 | x, y, z, c_1) = \]

\[ \frac{1}{4} \]

\[ \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \left( \frac{1}{4} \right)^3 \]

\[ \left( \frac{1}{4} \right)^3 \cdot 1 \cdot 1 \cdot 1 = \left( \frac{1}{4} \right)^3 = \frac{1}{64} \]

\[ \left( \frac{1}{4} \right)^3 \cdot 1 \cdot 1 \cdot 1 = \left( \frac{1}{4} \right)^3 = \frac{1}{64} \]

\[ y_i \cdot 1 \cdot 1 = y_i \]

\[ \frac{1}{4} \]

\[ \frac{1}{4} \]

\[ \frac{1}{4} \]
<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>C1</th>
<th>C2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
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</tr>
</tbody>
</table>

\[ \bar{p}(x, y, z, c) = \prod \]

\[ \frac{1}{4} \cdot 1 \cdot 1 = \frac{1}{4} \]
\[ P(X | c_1 = 1 \& c_2 = 1) = \]

\[ \prod P(X \& c_1 = 1 \& c_2 = 1) \]

\[ P(c_1 = 1 \& c_2 = 1) \]

\[ P(c_1 = 1 \& c_2 = 1) = \sum_{X, Y, Z} P(X, Y, Z, c_1 = 1, c_2 = 1) \]

\[ = \frac{4}{8} \]

i.e. prob. a word occurring together with both clauses is \( \frac{4}{8} \).
e.g.

\[ P(X = 1 | C_1 = 1 \& (c = 1)) = \frac{P(X = 1 \& C_1 = 1 \& (c = 1))}{P(C_1 = 1 \& (c = 1))} = \frac{5/10}{4/10} = \frac{5}{4} \]

\[ P(X = 1 \& C_1 = 1 \& (c = 1)) = \sum_{y_1, y_2, c_1, c_2} P(y_1, y_2, c_1, c_2) \]

\[ = \frac{2}{8} \]

\[ \Rightarrow \]

\[ P(X = 0 | C_1 = 1 \& (c = 1)) = \frac{2/10}{2/10} = \frac{1}{2} \]

from the assignment.

What happens when \( x = 1 \).

\[ P(x = 0 | C_1 = 1 \& (c = 1)) = \frac{2/8}{4/10} = \frac{5}{4} \]
\[ P(y = 1) = \frac{3}{4} \]  
\[ P(x = 1) = \frac{3}{4} \]  
\[ P(y = 0) = \frac{7}{8} \]  
\[ P(x = 0) = \frac{1}{4} \]

\[ P(y = 0, x = 1) = \frac{1}{8} \]  
\[ P(y = 1, x = 1) = \frac{3}{4} \]  
\[ P(y = 0, x = 0) = \frac{1}{8} \]  
\[ P(y = 1, x = 0) = \frac{1}{4} \]

Make intuitive sense,

\[ X \text{ both helps a clause and destroys a clause} \]
\[ X = 0 \& X = 1 \text{ symmetrical} \]

\[ y = 1 \text{ helps a clause, but does not harm.} \]
\[ y = 0 \text{ does not help.} \]