Warm-Up Questions

CIS 473/573
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Which of the following (conditional) independencies hold:

\( V \perp S \quad V \perp S|A \quad V \perp S|X \quad V \perp S|X,L \quad V \perp S|D,L \)
• Answer the following questions using this BN:

\[
\begin{align*}
P(a^0) &= 1/3 & P(a^1) &= 2/3 \\
P(b^0 | a^0) &= 1 & P(b^1 | a^0) &= 0 \\
P(b^0 | a^1) &= 1/2 & P(b^1 | a^1) &= 1/2 \\
P(c^0 | b^0) &= 0 & P(c^1 | b^0) &= 1 \\
P(c^0 | b^1) &= 1 & P(c^1 | b^1) &= 0
\end{align*}
\]

• What is \(P(b^0)\)?
• What is \(P(c^0)\)?
• What is \(P(c^0 | a^1)\)?
• What is \(P(a^1 | c^0)\)?

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**Warm-Up**

How many BN structures are I-equivalent to each of the following MN graphs:

1) ![Image 1](1)

2) ![Image 2](2)

3) ![Image 3](3)
Warm-Up

Write down the factorization entailed by this Markov network.

Is A independent of H given E, G, and B?

Warm-Up

Use variable elimination to compute Z for the following Gibbs distribution:
\[ P(A,B,C) = \frac{1}{Z} f_1(A,B) f_2(B,C) f_3(A,C) \]

<table>
<thead>
<tr>
<th>A B</th>
<th>( f_1(a,b) )</th>
<th>B C</th>
<th>( f_2(b,c) )</th>
<th>A C</th>
<th>( f_3(a,c) )</th>
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