The problem called Most-Probable Explanation (MPE) in the text is usually called Maximum A-Posteriori assignment (MAP).

Chapter 4 - Belief updating

\[ P(A_1, \ldots, A_6) = P(A_1) \times P(A_2|A_1) \times P(A_3|A_1) \times P(A_4|A_2) \times P(A_5|A_2, A_3) \times P(A_6|A_3) \]

\[ \phi_3(A_1, A_3) \]
by the chain rule for BNs.

Each of the functions is a potential.

Each potential has a domain, which is just the set of its variables.

E. g., $\text{Dom} \ (\phi_3) = \{ A_1, A_2 \}$

$\forall \in \Phi$

Calculate $P (A_V)$

$$P (A_V) = \sum_{A_1, A_2, A_3, A_5, A_6} \phi \cdot \phi_2 \cdot \phi_3 \cdot \phi_4 \cdot \phi_5 \cdot \phi_6.$$

$$= \sum_{A_1, A_2} \phi_1 (A_1) \sum_{A_3} \phi_2 (A_1, A_2) \sum_{A_5} \phi_3 (A_1, A_3) \sum_{A_4} \phi_4 (A_2, A_3) \sum_{A_5} \phi_5 (A_2, A_3, A_6) \sum_{A_6} \phi_6 (A_3, A_6).$$
\[
\sum_{\phi(A_2, A_3)} \sum_{\phi(A_1, A_2, A_3)} \phi(A_1, A_2, A_3)
\]