

**function** ENUMERATION-ASK( $X, \mathbf{e}, bn$ ) **returns** a distribution over  $X$

**inputs:**  $X$ , the query variable

$\mathbf{e}$ , observed values for variables  $\mathbf{E}$

$bn$ , a Bayes net with variables  $vars$

$\mathbf{Q}(X) \leftarrow$  a distribution over  $X$ , initially empty

**for each** value  $x_i$  of  $X$  **do**

$\mathbf{Q}(x_i) \leftarrow$  ENUMERATE-ALL( $vars, \mathbf{e}_{x_i}$ )

    where  $\mathbf{e}_{x_i}$  is  $\mathbf{e}$  extended with  $X = x_i$

**return** NORMALIZE( $\mathbf{Q}(X)$ )

**function** ENUMERATE-ALL( $vars, \mathbf{e}$ ) **returns** a real number

**if** EMPTY?( $vars$ ) **then return** 1.0

$V \leftarrow$  FIRST( $vars$ )

**if**  $V$  is an evidence variable with value  $v$  in  $\mathbf{e}$

**then return**  $P(v | parents(V)) \times$  ENUMERATE-ALL(REST( $vars$ ),  $\mathbf{e}$ )

**else return**  $\sum_v P(v | parents(V)) \times$  ENUMERATE-ALL(REST( $vars$ ),  $\mathbf{e}_v$ )

    where  $\mathbf{e}_v$  is  $\mathbf{e}$  extended with  $V = v$