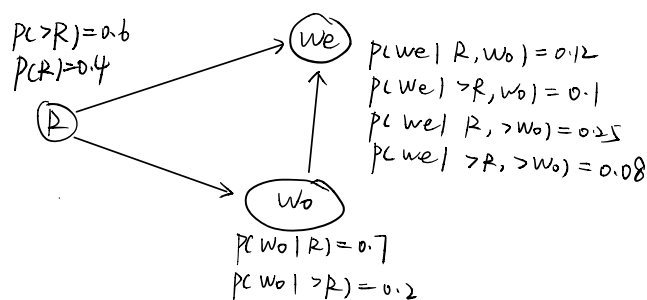


$$\begin{aligned}
 (a) \quad P(R) &= P(S) \cdot P(R/S) + P(\neg S) \cdot P(R/\neg S) \\
 &= 0.25 \times 0.7 + 0.75 \times 0.3 \\
 &= \underline{0.4}
 \end{aligned}$$

$\textcircled{S} \quad \begin{aligned} P(S) &= 0.25 \\ P(\neg S) &= 0.75 \end{aligned}$
 $\textcircled{P} \quad \begin{aligned} P(R/S) &= 0.7 \\ P(R/\neg S) &= 0.3 \end{aligned}$

(b)



$$\begin{aligned}
 \therefore P(We) &= P(We, R, W_0) + P(We, \neg R, W_0) + P(We, R, \neg W_0) + P(We, \neg R, \neg W_0) \\
 &= P(We | R, W_0) \cdot P(R, W_0) + P(We | \neg R, W_0) \cdot P(\neg R, W_0) + P(We | R, \neg W_0) \cdot P(R, \neg W_0) \\
 &\quad + P(We | \neg R, \neg W_0) \cdot P(\neg R, \neg W_0) \\
 &= P(We | R, W_0) \cdot P(W_0 | R) \cdot P(R) + P(We | \neg R, W_0) \cdot P(W_0 | \neg R) \cdot P(\neg R) \\
 &\quad + P(We | R, \neg W_0) \cdot P(\neg W_0 | R) \cdot P(R) + P(We | \neg R, \neg W_0) \cdot P(\neg W_0 | \neg R) \cdot P(\neg R) \\
 &= 0.12 \times 0.7 \times 0.4 + 0.1 \times 0.2 \times 0.6 + 0.25 \times 0.3 \times 0.4 + 0.08 \times 0.8 \times 0.6 \\
 &= \underline{0.114}
 \end{aligned}$$

$$(c) \quad P(M|S) = \frac{P(M, S)}{P(S)}$$

$$\begin{aligned}
 P(M, S) &= P(M, S, R, W_0, We) + P(M, S, \neg R, W_0, We) + P(M, S, R, \neg W_0, We) \\
 &\quad + P(M, S, R, W_0, \neg We) + P(M, S, \neg R, \neg W_0, We) + P(M, S, \neg R, W_0, \neg We) \\
 &\quad + P(M, S, R, \neg W_0, \neg We) + P(M, S, \neg R, \neg W_0, \neg We) \\
 &= P(M | We) \cdot P(We | R, W_0) \cdot P(W_0 | R) \cdot P(R | S) \cdot P(S) \\
 &\quad + P(M | We) \cdot P(We | \neg R, W_0) \cdot P(W_0 | \neg R) \cdot P(\neg R | S) \cdot P(S) \\
 &\quad + P(M | We) \cdot P(We | R, \neg W_0) \cdot P(\neg W_0 | R) \cdot P(R | S) \cdot P(S) \\
 &\quad + P(M | We) \cdot P(We | \neg R, \neg W_0) \cdot P(\neg W_0 | \neg R) \cdot P(\neg R | S) \cdot P(S)
 \end{aligned}$$

$$\begin{aligned}
& + P(L|M | \neg we) P(\neg we | R, w_0) P(w_0 | R) P(R | S) P(S) \\
& + P(L|M | \neg we) P(\neg we | \neg A, w_0) P(w_0 | \neg A) P(\neg A | S) P(S) \\
& + P(L|M | \neg we) P(\neg we | R, \neg w_0) P(\neg w_0 | R) P(R | S) P(S) \\
& + P(L|M | \neg we) P(\neg we | \neg R, \neg w_0) P(\neg w_0 | \neg R) P(\neg R | S) P(S) \\
& = 0.02 \times 0.12 \times 0.7 \times 0.7 + 0.02 \times 0.1 \times 0.2 \times 0.3 + 0.02 \times 0.25 \times 0.3 \times 0.3 \times 0.7 \\
& + 0.42 \times 0.88 \times 0.7 \times 0.7 + 0.02 \times 0.08 \times 0.8 \times 0.3 + 0.42 \times 0.9 \times 0.2 \times 0.3 \\
& + 0.42 \times 0.75 \times 0.3 \times 0.7 + 0.42 \times 0.9 \times 0.8 \times 0.3 \\
& = \underline{\underline{0.3654}}
\end{aligned}$$

$$(d) P(B|S) = \frac{P(B, S)}{P(S)}$$

$$\begin{aligned}
P(B, S) &= P(B, S, A, w_0) + P(B, S, \neg A, w_0) + P(B, S, R, \neg w_0) + P(B, S, \neg R, \neg w_0) \\
&= P(B|S, w_0) P(w_0 | A) \cdot P(A | S) \cdot P(S) + P(B|S, w_0) \cdot P(w_0 | \neg A) \cdot P(\neg A | S) \cdot P(S) \\
&+ P(B|S, \neg w_0) P(\neg w_0 | A) \cdot P(A | S) \cdot P(S) + P(B|S, \neg w_0) \cdot P(\neg w_0 | \neg R) \cdot P(\neg R | S) \cdot P(S) \\
&= 0.8 \times 0.7 \times 0.7 + 0.8 \times 0.2 \times 0.3 + 0.4 \times 0.3 \times 0.7 + 0.4 \times 0.8 \times 0.3 \\
&= \underline{\underline{0.62}}
\end{aligned}$$

$$(e) P(S | B, \neg w_0) = \frac{P(S, B, \neg w_0)}{P(B, \neg w_0)}$$

$$\begin{aligned}
P(S, B, \neg w_0) &= P(S, B, \neg w_0, R) + P(S, B, \neg w_0, \neg R) \\
&= P(B|S, \neg w_0) \cdot P(\neg w_0 | R) \cdot P(R | S) \cdot P(S) \\
&+ P(B|S, \neg w_0) \cdot P(\neg w_0 | \neg R) \cdot P(\neg R | S) \cdot P(S) \\
&= 0.4 \times 0.3 \times 0.7 \times 0.25 + 0.4 \times 0.8 \times 0.3 \times 0.25 \\
&= 0.045
\end{aligned}$$

$$P(LB, > w_0) = P(LB, S, > w_0, R) + P(LB, S, > w_0, R) \\ + P(LB, S, > w_0, > R) + P(LB, > S, > w_0, > R)$$

$$= P(LB/S, > w_0) \cdot P(> w_0/R) \cdot P(R/S) \cdot P(S) \\ + P(LB/S, > w_0) \cdot P(> w_0/R) \cdot P(R/S) \cdot P(> S) \\ + P(LB/S, > w_0) \cdot P(> w_0/R) \cdot P(R/S) \cdot P(S) \\ + P(LB/S, > w_0) \cdot P(> w_0/R) \cdot P(R/S) \cdot P(> S)$$

$$= 0.4 \times 0.3 \times 0.7 \times 0.25 + 0.4 \times 0.3 \times 0.3 \times 0.75 + 0.4 \times 0.8 \times 0.3 \times 0.25 \\ + 0.4 \times 0.8 \times 0.7 \times 0.75 = 0.24$$

$$\therefore P(S/B, > w_0) = \frac{0.045}{0.24} = \underline{\underline{0.1875}}$$