

(a)

$$\begin{aligned}
 P(W) &= \sum P(W, C=C, R=R, S=S) \\
 &= \sum_{C,R,S} P(W|C=C, R=R, S=S) P(C=C) P(R=R) P(S=S) \\
 &= (0.99 \times 0.8 \times 1 \times 1) \\
 &\quad + (0.9 \times 0.8 \times 0.9 \times 0.5) \\
 &\quad + (0 \times 0.2 \dots) + (0.99 \times 0.2 \times 1 \times 1) \\
 &\quad + (0.9 \times 1.2 \times 1.5 \times 1.5) \\
 &\quad + (0.9 \times 1.8 \times 1.5 \times 1.5) \\
 &\quad + (0 \times 1.8 \times 1.5) \\
 &= 0.6471
 \end{aligned}$$

Now, for,

$$\begin{aligned}
 P(R|W) &= \sum P(W, R, C=C, S=S) \\
 &= (0.99 \times 0.8 \times 1 \times 1) \\
 &\quad + (0.9 \times 1.8 \times 1.9 \times 1.5) \\
 &\quad + (0.99 \times 0.2 \times 1.5 \times 1.5) \\
 &= 0.4581
 \end{aligned}$$

$$\therefore P(R|W) = 0.4581 / 0.6471 = 0.7079.$$

$$P(S|W) = \frac{P(S, W)}{P(W)} = \frac{0.2781}{0.6471} = 0.4292$$

So, since  $P(R|W) > P(S|W)$ , so, it is more likely to rain.

$$(b) \underline{P(W=10T)}$$

$$P(W) = \sum P(W, C=c, R=r, S=s)$$

$$= \sum_{C \in \{T, F\}} \sum_{R \in \{1, 2\}} \sum_{S \in \{1, 5\}} P(W | C=c, R=r, S=s) P(R=r, S=s | C=c) P(C=c)$$

$$= \sum (P(W | R=0, S=5) P(R=0 | C=c) P(S=5 | C=c) P(C=c))$$

$$= (0.99 \times 0.8 \times 0.1 \times 0.5)$$

$$+ (0.9 \times 0.8 \times 0.9 \times 0.5) + (0.9 \times 0.2 \times 0.1 \times 0.5)$$

$$+ (0 \times 0.2 \dots) + (0.9 \times 0.2 \times 0.5 \times 0.5) + (0.9 \times 0.8 \times 0.5 \times 0.5)$$

$$+ (0 \times 0.8 \times 0.5 \dots)$$

$$= \underline{0.6471}$$

$$\therefore P(W=T) = \underline{0.6471}$$