

Homework 2 - 2d

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① $P(\text{cloudy}) = \boxed{\langle 0.5, 0.5 \rangle}$ (from the table)

②
$$\begin{aligned} P(\text{Sprinkler} \mid \text{cloudy}) &= \alpha \sum_a P(S, c) \\ &= \alpha \sum_a P(S) \cdot P(C|S) \\ &= \alpha \langle (0.1 \cdot 0.5), (0.9 \cdot 0.5) \rangle \\ &= \alpha \langle \frac{0.05}{0.5}, \frac{0.45}{0.5} \rangle \\ &= \boxed{\langle 0.1, 0.9 \rangle} \end{aligned}$$

③
$$\begin{aligned} P(C|S \cap \neg R) &= \alpha \sum_a P(C, S, \neg R) \\ &= \alpha \sum_a P(C) \cdot P(S|C) \cdot P(\neg R|C) \\ &= \alpha \langle (0.5 \cdot 0.1 \cdot 0.2), (0.5 \cdot 0.5 \cdot 0.8) \rangle \\ &= \alpha \langle \frac{0.01}{0.21}, \frac{0.2}{0.21} \rangle \\ &= \boxed{\langle 0.0476, 0.9524 \rangle} \end{aligned}$$

④ $P(W \mid C \cap S \cap R) = \boxed{\langle 0.99, 0.01 \rangle}$ (from the table, "disregarding" the cloudy factor since it would have already been accounted for)

⑤ $P(\text{cloudy} \mid \text{Wet Grass}) = \boxed{\langle 0.5, 0.5 \rangle}$ (The cloudy variable is independent of whether or not there is wet grass, so its probabilities remain 0.5 and 0.5)