MAS Probabilistic Reasoning

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Probabilistic Reasoning: Assignment 3
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I. Question 1

13.10 Show the statement 1 is equivalent to either 2 or 3.

$$P(A, B \mid C) = P(A \mid C)P(B \mid C) \tag{1}$$
$$P(A \mid B, C) = P(A \mid C) \tag{2}$$
$$P(B \mid A, C) = P(B \mid C) \tag{3}$$

$$P(A, B \mid C) = P(A \mid C)P(B \mid C) \tag{1}$$
$$\frac{P(A, B, C)}{P(C)} = P(A \mid C)\frac{P(B, C)}{P(C)} \tag{2}$$
$$\frac{P(A \mid B, C)P(B, C)}{P(C)} = P(A \mid C)\frac{P(B, C)}{P(C)} \tag{3}$$
$$P(A \mid B, C)\frac{P(B, C)}{P(C)} = P(A \mid C)\frac{P(B, C)}{P(C)} \tag{4}$$
$$P(A \mid B, C) = P(A \mid C) \tag{5}$$

II. QUESTION 2

13.20 For the Wumpus world in Chap. 13.7 compute the term $\sum_{other} P(other)$ for the various pit configurations shown on p. 485

The various pit configurations do not affect the sum, the wumpus world problem description states "(2) each square other than [1, 1] contains a pit with the probability 0.2"

$$\sum_{other} P(other) = ? \tag{1}$$

$$other = \{(1,4),(2,4),(3,4),(4,4),(2,3),(3,3),(4,3),(3,2),(4,3),(4,1)\} \tag{2}$$

$$\sum_{other} P(other) = a\sum_{i=1}^{10} P(P_{other[i]}) \tag{3}$$

$$\sum_{other} P(other) = a\sum_{i=1}^{10} 0.2 \tag{4}$$

$$\sum_{other} P(other) = a(0.2 + 0.2 + 0.2 + ... + 0.2 + 0.2 + 0.2) \tag{5}$$

$$a = \frac{1}{\sum_{other} P(other)} \tag{6}$$

$$a = \frac{1}{2} \tag{7}$$

$$\sum_{other} P(other) = \frac{1}{2}(2) \tag{8}$$

$$\sum_{other} P(other) = 1 \tag{9}$$