Recitation 14

Solutions

November 27, 2001

14 I

1. $P(A \vee \neg A) = p(A) + P(\neg A) - P(A \wedge \neg A)$
   $P(A \wedge \neg A) = 0$ and $P(A \vee \neg A) = 1$
   so $P(A) = 1 - P(A)$

2. $P(A \vee B \vee C) = P(A) + P(B \vee C) - P(A \wedge (B \vee C)) = P(A) + P(B \vee C) + P((A \wedge B) \vee (A \wedge C))$
   $= P(A) + P(B) + P(C) - P(B \wedge C) - P(A \wedge C) - P(A \wedge B) + P(A \wedge B \wedge C)$

14 II

1. $P(A) - P(AB) = p(A \vee B) - P(B)$
   $P(A) - P(AB) \geq 0$ since $P(A \vee B) \geq P(B)$

2. $P(A|BC) = P(A|C)$ is equivalent to eq 1: $\frac{P(ABC)}{P(BC)} = \frac{P(AC)}{P(C)}$
   multiply both sides of eq 1 by $\frac{P(BC)}{P(AC)}$ to arrive at $P(B|AC) = P(B|C)$
   multiply both sides of eq 1 by $\frac{P(BC)}{P(C)}$ to arrive at $P(AB|C) = P(B|C)P(A|C)$

3. $P(A|BC) = \frac{P(B|AC)P(A|C)}{P(B|C)}$ (from AIMA pg 426)