

$$P(X, \Omega) = P(\Omega)P(X|\Omega) = P(X)P(\Omega|X) \quad (1)$$

$$P(X) = \sum_{\Omega} P(X, \Omega) \quad (2)$$

$$= \sum_{\Omega} P(\Omega) P(X|\Omega) \quad (3)$$

$$P(\Omega|X) = \frac{P(X|\Omega)}{P(X)} \cdot P(\Omega) \quad (4)$$

$$= \frac{P(X|\Omega)}{\sum_{\Omega} P(\Omega) P(X|\Omega)} \cdot P(\Omega) \quad (5)$$

$$P(\Omega_A|X_B) = \frac{P(\Omega_A)P(X_B|\Omega_A)}{P(X_B)} \quad (6)$$

$$= \frac{P(\Omega_A)P(X_B|\Omega_A)}{\sum_{\Omega} P(\Omega) P(X_B|\Omega)} \quad (7)$$

$$= \frac{P(\Omega_A)P(X_B|\Omega_A)}{P(\Omega_A)P(X_B|\Omega_A) + P(\Omega_B)P(X_B|\Omega_B) + P(\Omega_C)P(X_B|\Omega_C)} \quad (8)$$

$$P(\omega_i|x) = \frac{P(x|\omega_i)}{P(x)} \cdot P(\omega_i) \quad (i = 1, \dots, 3) \quad (9)$$

$$P(x) = \sum_{i=1}^3 P(\omega_i) P(x|\omega_i) \quad (10)$$

$$\sum_{i=1}^3 P(\omega_i) = 1 \quad (11)$$

$$\sum_{i=1}^3 P(\omega_i|x) = 1 \quad (12)$$

$$\sum_{x=0}^n P(x) = 1 \quad (13)$$