Q1.
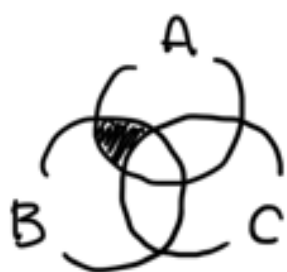$$A \cap (B-C) = (A \cap B) \cap (A \cap C^c)$$
$$= (A \cap B \cap C^c)$$
$$= \underbrace{(A \cap B \cap A^c)}_{\phi} \cup (A \cap B \cap C^c)$$
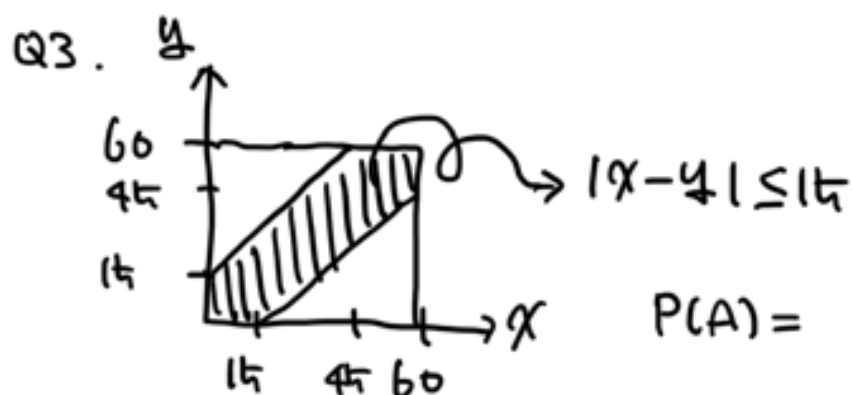$$= (A \cap B) \cap (A^c \cup C^c)$$
$$= (A \cap B) \cap (A \cap C)^c = \underline{(A \cap B) - (A \cap C)}$$

Q2.
$$P(A \cap B) = P(A) + P(B) - P(A \cup B)$$
$$= \frac{3}{5} + \frac{7}{10} - \frac{5}{7} = \underline{\frac{41}{70}}$$

Q3.

$|x - y| \leq 15$

$$P(A) = \frac{\text{빗금}}{\text{전체넓이}} = \frac{60 \times 60 - 45 \times 45}{60 \times 60}$$
$$= \frac{1575}{3600} = \frac{7}{16}$$

Q4. B : 검은공, W : 흰공

(a)
$$P(BBB) = \frac{5}{8} \times \frac{4}{7} \times \frac{3}{6} = \frac{60}{336} = \underline{\frac{5}{28}}$$

(b)
$$P(WWW) = \frac{3}{8} \times \frac{2}{7} \times \frac{1}{6} = \underline{\frac{1}{56}}$$

(c)
$$P(BWW) + P(WBW) + P(WWB)$$
$$= \frac{5}{8} \times \frac{3}{7} \times \frac{2}{6} + \frac{3}{8} \times \frac{5}{7} \times \frac{2}{6} + \frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$$

$$= \frac{50 + 50 + 50}{336} = \frac{15}{56}$$

Q5. O : 두렵다.   X : 안두렵다.

(a) $P(O) = \dfrac{0.25}{100} = \dfrac{1}{4}$

(b) $P(O \mid 중) = \dfrac{P(O \cap 중)}{P(중)} = \dfrac{0.07}{0.35} = \dfrac{1}{5}$

Q6. $P(A) > 0$, $P(B) > 0$

(a) $P(A|B) \geq P(A)$ 이면, $P(B|A) \geq P(B)$ 이다?

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \geq P(A)$$

$$\Leftrightarrow \quad \frac{P(A \cap B)}{P(A)} \geq P(B)$$

$$\Leftrightarrow \quad P(B|A) \geq P(B) \qquad \therefore 참$$

(b) $P(A|B) = P(B)$ 이면, $P(B|A) = P(A)$ 이다?

$$P(A|B) = P(B) \quad \Leftrightarrow \quad P(A \cap B) = P(B)P(B)$$

$$\Leftrightarrow \quad P(B|A)P(A) = P(B)P(B)$$

$$\Leftrightarrow \quad P(A)P(A) = P(B)P(B)$$

$$\Leftrightarrow \quad P(A) = P(B)$$

$P(A) = P(B)$ 라면,

$$P(B|A) = P(A) \quad \Leftrightarrow \quad P(A \cap B) = P(A)P(B)$$

에서 A와 B가 독립일 때만 성립

$\therefore$ 거짓

Q7. A와 B가 독립이면, A와 B^c도 독립이다?

독립이면, $P(A \cap B) = P(A)P(B)$

$$P(A \cap B^c) = P(A - B)$$
$$= P(A) - P(A \cap B)$$
$$= P(A) - P(A)P(B)$$
$$= P(A)\{1 - P(B)\}$$
$$= P(A)P(B^c) \qquad \therefore \text{독립}$$

Q8. $P(A) = 0.45$, $P(B|A) = 0.8$

$$P(A \cap B) = P(B|A)P(A) = 0.45 \times 0.8 = 0.36$$

Q9. $P(병) = 0.005$, $P(양성|병) = 0.95$,
$$P(음성|{\sim}병) = 0.99$$

(a) 양성판정 $= P(양성 \cap 병) + P(양성 \cap {\sim}병)$
$$= P(양성|병) \cdot P(병) + P(양성|{\sim}병)P({\sim}병)$$
$$= 0.95 \times 0.005 + (1 - 0.99) \times 0.995$$
$$= 0.0147$$

(b) $P(병|양성)$
$$= \frac{P(양성|병) \cdot P(병)}{P(양성)} = \frac{0.95 \times 0.005}{0.0147}$$

$$= 0.323$$