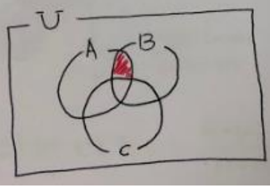
1. $A \cap (B-C) = (A \cap B) - (A \cap C)$ 증명.

$$\Rightarrow A \cap (B-C) = A \cap (B \cap C^c)$$
$$= (B \cap (A \cap C^c)) \cup \phi$$
$$= (B \cap (A \cap C^c)) \cup (B \cap \phi)$$
$$= B \cap ((A \cap C^c) \cup \phi)$$
$$= B \cap ((A \cap C^c) \cup (A \cap A^c))$$
$$= B \cap (A \cap (A^c \cup C^c))$$
$$= (A \cap B) \cap (A \cap C)^c$$
$$= (A \cap B) - (A \cap C)$$



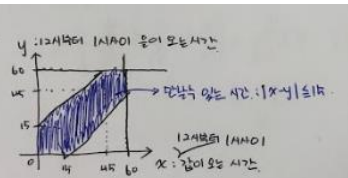
2. $P(A) = \frac{3}{5}$, $P(B) = \frac{7}{10}$

$\Rightarrow P(A \cup B) = \frac{5}{7}$

$$P(A \cap B) = P(A) + P(B) - P(A \cup B)$$
$$= \frac{3}{5} + \frac{7}{10} - \frac{5}{7}$$
$$= \frac{205}{350} = \frac{41}{70}$$

$\therefore \frac{41}{70} = 0.586$

3.



갑과 을이 만날 확률 : $\frac{(60\times60)-(45\times45)}{60\times60} = \frac{1575}{3600} = \frac{7}{16}$

$\therefore \frac{7}{16} = 0.4375$

4. (a) 검은공 : 5개

흰공 : 3개.

검은공 3개 뽑을 사건의 확률.

$$\frac{5}{8} \times \frac{4}{7} \times \frac{3}{6} = \frac{5}{28}$$

$\therefore \frac{5}{28} \doteqdot 0.179$

(b) 흰공 3개 뽑을 사건의 확률

$$\frac{3}{8} \times \frac{2}{7} \times \frac{1}{6} = \frac{1}{56}$$

$\therefore \frac{1}{56} \doteqdot 0.018$

(c) 검은공 1개, 흰공 2개 뽑을 사건의 확률.

$$3 \times \left(\frac{5}{8} \times \frac{3}{7} \times \frac{2}{6}\right) = \frac{5}{56} \times 3$$
$$= \frac{15}{56}$$

$\therefore \frac{15}{56} \doteqdot 0.268$

5. (a) 주사접종을 두려워 하는 학생의 확률 : 0.25

(b) A : 중학생일 확률.

B : 주사를 두려워 할 확률.

$$\Rightarrow P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{0.07}{0.35} = \frac{1}{5}$$

$\therefore 0.2$

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

(a) $P(A|B) \geq P(A) \rightarrow P(B|A) \geq P(B)$ $\therefore$ 참.

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

$P(A)$, $P(B)$ 가 모두 0보다 크므로

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

(b) $P(A|B) = P(B) \rightarrow P(B|A) = P(A)$ $\therefore$ 거짓

$\Rightarrow$ left :

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

right :

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

A와 B가 일어날 확률이 같아야만 성립

7. 사건 A와 B가 독립이므로..

$$P(A \cap B) = P(A) \cdot P(B)$$
$$P(A \cap B^c) = P(A) - P(A \cap B)$$
$$= P(A) - P(A) \cdot P(B)$$
$$= P(A)[1 - P(B)]$$
$$= P(A) \cdot P(B^c)$$

$\therefore$ A와 B^c 도 독립이다.

8. P(A): A대학 봉역을 얻어내는 확률

P(B): B대학 봉역을 얻어내는 확률

$P(A) = 0.45$

$P(B/A) = 0.8$.

$P(A \cap B)$?

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

$\therefore 0.36$

$$\begin{aligned} P(A \cap B) &= P(A) \cdot P(B|A) \\ &= 0.45 \times 0.8 \\ &= 0.36 \end{aligned}$$

9. A: 병에 걸림

B: 병이 있다고 진단.

$P(A) = 0.005$, $P(A^c) = 0.995$.

① 병이 있을때 병이 있다고 진단 $\Rightarrow P(B|A) = 0.95$

② 병이 없을때 병이 없다고 진단 $\Rightarrow P(B^c|A^c) = 0.99$.

(a) 양성판정 ⇒ 병이 있을때 양성판정 ($P(B|A)$)

병이 없을때 양성판정 ($P(B|A^c)$)

$$\begin{aligned} & P(B|A) \cdot P(A) + P(B|A^c) \cdot P(A^c) \\ &= 0.95 \times 0.005 + 0.01 \times 0.995 \\ &= 0.0147. \end{aligned}$$

(b) 양성판정 받았을때 실제 병에 걸릴 확률

$$\frac{P(B|A) \cdot P(A)}{P(B|A) \cdot P(A) + P(B|A^c) P(A^c)} = \frac{0.95 \times 0.005}{0.0147}$$

$$= \frac{95}{294} \doteq 0.323$$