2017-12451 컴퓨터공학부 이동학 이산수학 과제5

7.1.38. a) $P(E_1)=\frac{1}{2}$, $P(E_2)=\frac{1}{2}$, $P(E_1\cap E_2)=\frac{1}{4}$,
$\therefore P(E_1)P(E_2)=P(E_1\cap E_2)$ t 독립이다.

b) $P(E_1)=\frac{1}{2}$, $P(E_2)=\frac{1}{4}$, $P(E_1\cap E_2)=\frac{1}{8}$
$\therefore P(E_1)P(E_2)=P(E_1\cap E_2)$ t 독립이다.

c) $P(E_1)=\frac{1}{2}$, $P(E_2)=\frac{1}{4}$, $P(E_1\cap E_2)=0$
$\therefore P(E_1)P(E_2)\neq P(E_1\cap E_2)$ t 독립이 아니다.

7.2.24. $P_r(4\text{ head} \mid 5\text{ flip, first}=\text{tail})=\frac{1}{2^4}=\frac{1}{16}$

7.2.34. a) $b(0;n,p)=(1-p)^n$, b) $1-(1-p)^n$
c) $b(0;n,p)+b(1;n,p)=(1-p)^n+n\cdot p\cdot(1-p)^{n-1}$
d) $1-(1-p)^n-np(1-p)^{n-1}$

7.3.14. $$P(F_2|E)=\frac{P(E|F_2)P(F_2)}{P(E|F_1)P(F_1)+P(E|F_2)P(F_2)+P(E|F_3)P(F_3)}$$
$$=\frac{3/8\cdot 1/2}{2/7\cdot 1/6+3/8\cdot 1/2+1/2\cdot 1/3}=\frac{7}{15}$$

7.3.22. a) $P(S)=s/s+h$, $P(\bar{S})=h/s+h$

b) $P(W|S)=p(w)$, $p(W|\bar{S})=q(w)$ 일 때

$$P(S|W)=\frac{P(W|S)P(S)}{P(W|S)P(S)+P(W|\bar{S})P(\bar{S})}=\frac{p(w)\cdot\frac{s}{s+h}}{p(w)\cdot\frac{s}{s+h}+q(w)\cdot\frac{h}{s+h}}=\frac{p(w)s}{p(w)s+q(w)h}$$

7.4.18. $E(Z) = \sum p(s) Z(s) \le \sum p(s)(X(s)+Y(s))$

$= \sum p(s) X(s) + \sum p(s) Y(s) = E(X) + E(Y)$

7.4.38. a) $E(X) = 10000$, $a = 11000 \to p(X \ge 11000) \le \frac{10000}{11000} = \frac{10}{11}$

b) $r = 1000 \to P(|X - 10000| \ge 1000) \le \frac{1000}{1000^2} = 0.001$,

$\therefore p(|X - 10000| \le 1000) = 0.999$

7.4.48. $X = X_1 + \cdots + X_m$, $X_i = \begin{cases} 1 & (\text{ith ball falls into 1st bin}) \\ 0 & (\text{otherwise}) \end{cases}$

$\to E(X_i) = p(X_i = 1) = \frac{1}{n}$, $\therefore E(X) = \sum E(X_i) = \frac{m}{n}$