# Probability Execises Lecture 3 I

1. (a) $A=\{g \mid st\}$ $B=\{g \mid st\}$

$P(A)=0.5$, $P(B)=0.5$

$$P(B|A)=\frac{P(A\cap B)}{P(A)}=\frac{P(A)\cdot P(B)}{P(A)}=0.5$$

(b) $P(A\cup B)=P(A)+P(B)-P(A\cap B)=0.5+0.5-0.5\times 0.5=0.75$

$$P(A\cap B|A\cup B)=\frac{P(A\cap B)}{P(A\cup B)}=\frac{0.5\times 0.5}{0.75}=\frac{1}{3}$$

2. (a) $T=\{2,\dots,12\}$

$A=\{3,5,7,9,11\}$, $P=\frac{P(\{3,5,7\})}{P(A)}=\frac{12/36}{18/36}=\frac{2}{3}$

(b) $P(A)=\frac{1}{36}\times 6=\frac{1}{6}$, $P(B)=P(\{8,9,10,11,12\})=\frac{15}{36}=\frac{5}{12}$

$$P(A|B)=\frac{P(A\cap B)}{P(B)}=\frac{3/36}{15/36}=\frac{1}{5}$$

$$P(B|A)=\frac{P(A\cap B)}{P(A)}=\frac{3/36}{1/6}=\frac{1}{2}$$

3. $P(A)=\frac{\binom{4}{2}}{\binom{52}{2}}=\frac{\frac{4!}{2!2!}}{\frac{52!}{50!2!}}=\frac{4!50!}{2!52!}=\frac{\overset{1}{\cancel{4}}\times\overset{1}{\cancel{3}}\times 2}{2\times\underset{13}{\cancel{52}}\times\underset{17}{\cancel{51}}}=\frac{1}{221}$ 52张牌