#48

3 red 2 white

take a ball, put it back with another ball of the same color. Take 2nd Ball

(a). $P(2^{nd}=w)=?$

(b). $P(1^{st}=red \mid 2^{nd}=w)=?$

Soln: (a). $P(2^{nd}=w)=P(2=w,1=w)$ +

$+P(2=w,1=r)$

$=P(2=w \mid 1=w)P(1=w)$

$+P(2=w \mid 1=r)P(1=r)$

$=\frac{3}{6}\cdot\frac{2}{5}+\frac{2}{6}\cdot\frac{3}{5}=\frac{2}{5}$

(b). $P(1=r \mid 2=w)=\frac{P(1=r,2=w)}{P(2=w)}=\frac{P(2=w \mid 1=r)P(1=r)}{P(2=w)}=\frac{1/5}{2/5}=\frac{1}{2}$

#62. $P(A \mid E)\geq P(B \mid E)$, $P(A \mid E^c)\geq P(B \mid E^c)$. Show $P(A)\geq P(B)$

Sol'n:

$P(A)=P(A\cap E)+P(A\cap E^c)$

$=P(A \mid E)P(E)+P(A \mid E^c)P(E^c)$

$\geq P(B \mid E)$ $\quad$ $\geq P(B \mid E^c)$

$\geq P(B \mid E)P(E)+P(B \mid E^c)P(E^c)$

$=P(B\cap E)+P(B\cap E^c)=P(B)$.

#68. A indep of B, B is indep. of C.

$\overset{?}{\Rightarrow}$ A is indept of C? No!

roll a die

$A = \{1, 3, 5\}$

$B = \{2, 4, 6\}$

$C = \{1, 2\}$