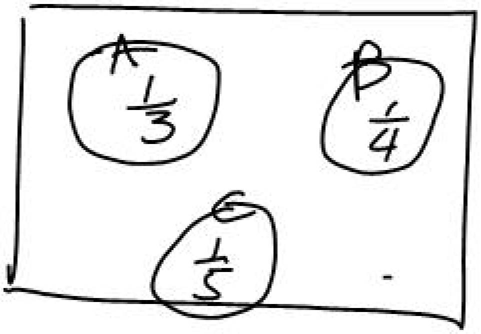
3D



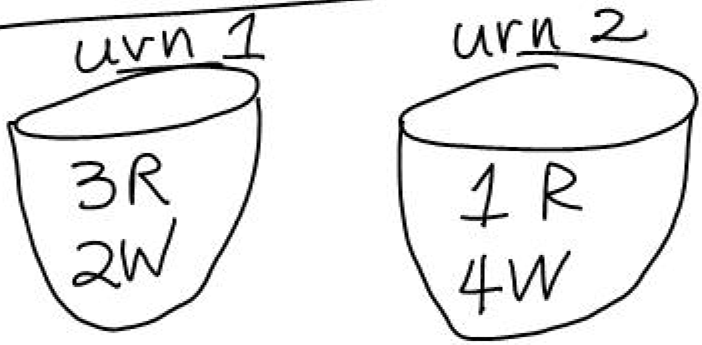
The Product Rule for Independent Events

If A and B are independent Events,

then $P(A \cap B) = P(A) \cdot P(B)$

The converse is also true

EX



A marble is drawn from each urn.

a) $P(\text{both red}) = P(R_1) \cdot P(R_2)$

$$= \frac{3}{5} \cdot \frac{1}{5} = \frac{3}{25}$$

R_1 and R_2 are independent events.

(b) $P(2 \text{ different colors})$

$$P(R_1 \cap W_2) = \frac{3}{5} \cdot \frac{4}{5} = \frac{12}{25}$$

$$P(W_1 \cap R_2) = \frac{2}{5} \cdot \frac{1}{5} = \frac{2}{25}$$

$$P\left(\underbrace{(R_1 \cap W_2)} \cup \underbrace{(W_1 \cap R_2)}\right) = P(R_1 \cap W_2) + P(W_1 \cap R_2)$$

mutually exclusive

$$= \frac{12}{25} + \frac{2}{25}$$

$$= \frac{14}{25}$$

(c) $P(\text{at least 1 white})$

* $P(W_1 \cap R_2) + P(R_1 \cap W_1) + P(W_1 \cap W_2)$

* $1 - P(R_1 \cap R_2) = 1 - \frac{3}{5} \cdot \frac{1}{5}$

$$= 1 - \frac{3}{25} = \frac{22}{25}$$

$\boxed{3F}$ #9 $P(E') = 0.6$

$$P(F) = 0.6$$

$$P(E \cap F) = 0.24$$

(a) $P(E) = 0.4$

*(b) $\underbrace{P(E) \cdot P(F)} = (0.4)(0.6) = 0.24 = \underbrace{P(E \cap F)}$

($b\frac{1}{2}$) Evaluate $P(E|F) = \dfrac{P(E \cap F)}{P(F)}$

$$= \frac{0.24}{0.6} = \underline{\underline{0.4}}$$

$P(E|F) = P(E) = 0.4$

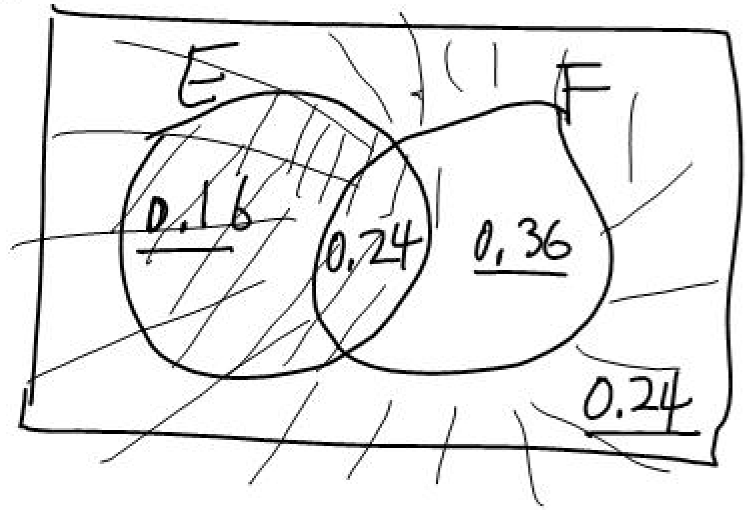
These are independent — it doesn't matter whether F happens or not

($b\frac{3}{4}$) $P(F|E) = 0.6 = P(F|E')$

$\uparrow$
$P(F)$

(c) $P(E \cap F) = 0.24 \neq 0$

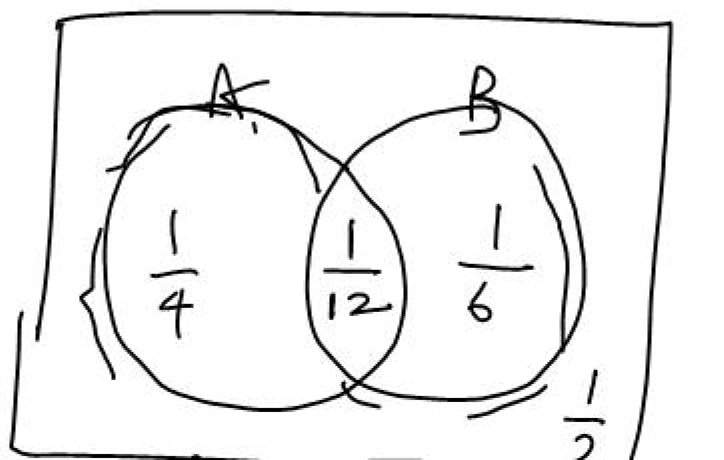
(d) $P(E \cup F') = 1 - 0.36 = 0.64$



$$\begin{array}{r} .40 \\ .24 \\ \hline .16 \end{array} \qquad \begin{array}{r} .60 \\ -\ .24 \\ \hline .36 \end{array}$$

$$\begin{array}{r} .16 \\ .24 \\ .36 \\ \hline .76 \end{array}$$

Ex. $\left.\begin{array}{l} P(A) = \frac{1}{3} \\ P(B) = \frac{1}{4} \\ P(A' \cap B') = \frac{1}{2} \end{array}\right\}$ Are A and B independent?



$P(A) \cdot P(B) = \frac{1}{3} \cdot \frac{1}{4} = \frac{1}{12}$

$P(A \cap B) = \frac{1}{12}$

A and B are independent.

HW 3F
#1-3, 5, 8, 12