

#4

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

$$0.1 = \frac{P(A \cap B)}{0.2}$$

$$0.02 = P(A \cap B)$$

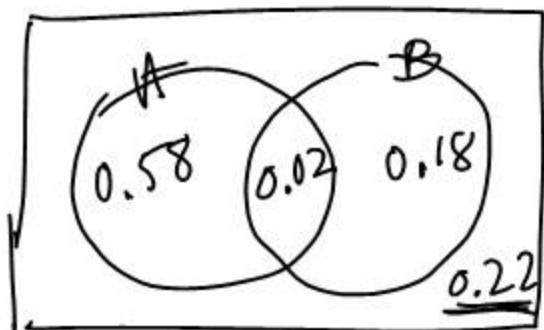
$$(b) P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.6 + 0.2 - 0.02$$

$$= 0.78 \leftarrow$$

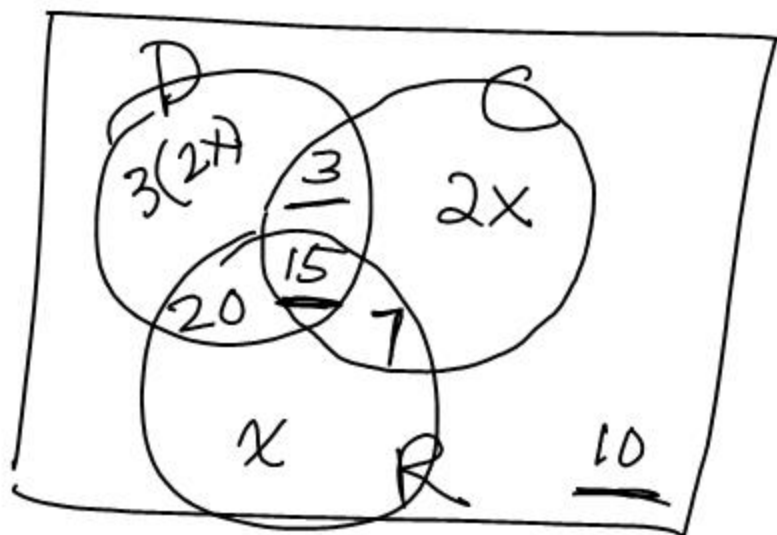
$$(c) P(A \cap B') + P(A' \cap B) = 0.58 + 0.18$$

$$= 0.76$$



$$(d) P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{0.02}{0.60} = \frac{1}{30}$$

#5



$$100 = 6x + 2x + x + 20 + 15 + 7 + 3 + 10$$

$$100 = 9x + 55$$

$$45 = 9x$$

$$5 = x$$

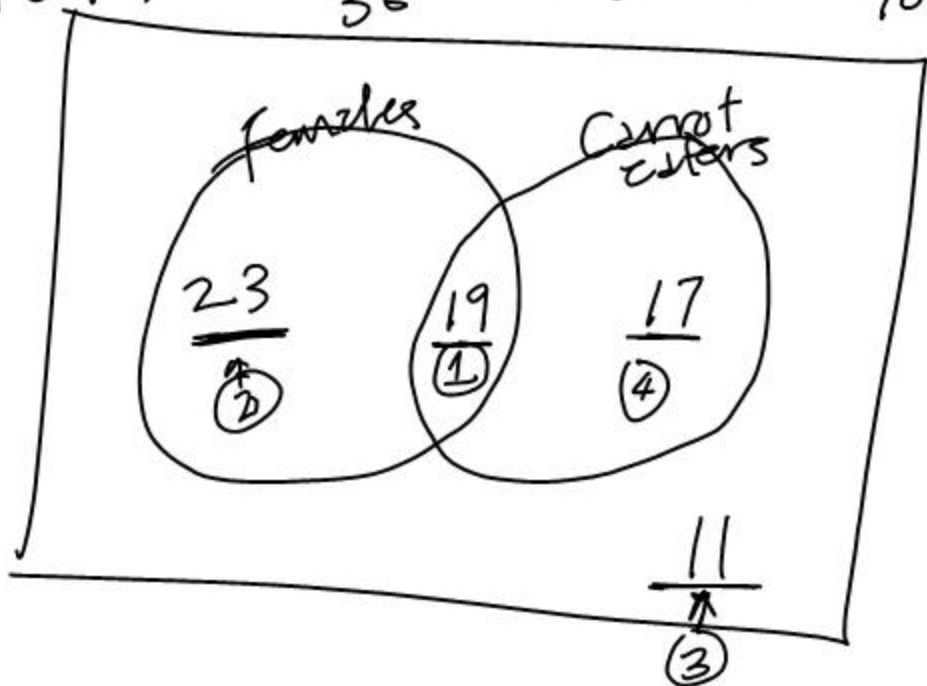
$$= \frac{54}{175}$$

$$\textcircled{c} P(F) \cdot P(C) = \frac{42}{70} \cdot \frac{36}{70}$$

#5 $\textcircled{b} P(F|C) = \frac{19}{36}$ $P(F \cap C) = \frac{19}{70}$ ~~NOT independent~~

$$\begin{array}{r} 42 \\ - 23 \\ \hline 19 \end{array}$$

$$\begin{array}{r} 34 \\ - 23 \\ \hline 11 \end{array}$$



$$\begin{array}{r} 23 \\ + 19 \\ \hline 42 \end{array}$$

$$\begin{array}{r} 10 \\ - 53 \\ \hline 17 \end{array}$$

If A and B are independent events, then

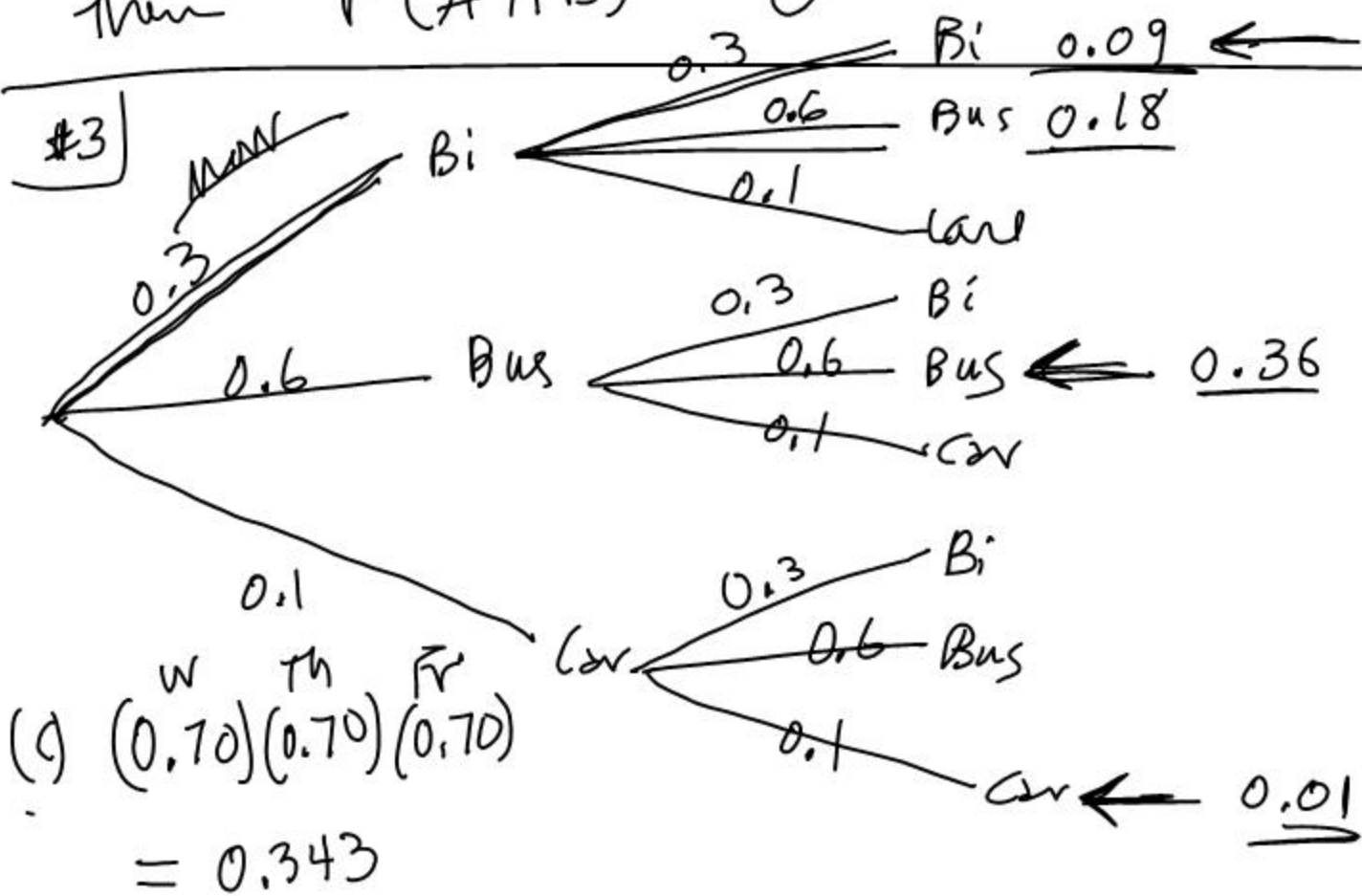
- $P(A) \cdot P(B) = P(A \cap B)$

- $P(A|B) = P(A)$

- $P(B|A) = P(B)$

pp. 96-97
Summary

If A and B are mutually exclusive,
then $P(A \cap B) = 0$



The Binomial Theorem

$$(x+y)^4 = (x+y)(x+y)(x+y)(x+y)$$

$$= x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

$\binom{4}{3}$
 $\leftarrow 4 \text{ binomials}$

Combinations

$\binom{n}{r}$ read "n choose r"

$\binom{n}{r}$ is the number of ways to choose r objects out of a set of n objects.

Ex. $\binom{5}{2} = 10$

EX. $\binom{12}{2} = \frac{12!}{2! 10!}$
 $= \frac{\overset{6}{\cancel{12}} \cdot 11 \cdot \cancel{10!}}{\cancel{2!} \cdot \cancel{10!}} = 66$

Formula

$$\binom{n}{r} = \frac{n!}{r! (n-r)!}$$

$$6! = \underset{-}{6} \cdot \underset{-}{5} \cdot \underset{-}{4} \cdot \underset{-}{3} \cdot \underset{-}{2} \cdot \underset{-}{1}$$

$$\text{Ex. } \binom{9}{4} = \frac{9!}{4! 5!} \quad \begin{array}{r} 42 \\ \times 3 \\ \hline 126 \end{array}$$

$$= \frac{3 \cancel{9} \cdot \cancel{8} \cdot 7 \cdot 6 \cdot \cancel{5}!}{\cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{5}!} = 126$$

$$\text{Ex. } (2x - 3)^5$$

$$= (2x)^5 + \binom{5}{1} (2x)^4 (-3)^1 + \binom{5}{2} (2x)^3 (-3)^2$$

$$+ \binom{5}{3} (2x)^2 (-3)^3 + \binom{5}{4} (2x)^1 (-3)^4 + (-3)^5$$

$$= 32x^5 - 240x^4 + 720x^3 - 1080x^2$$

$$+ 810x - 243$$