

Section 10.8 Multiplication Rule $\frac{1}{4}$
or = add
and = multiply

Two events A and B are independent if the fact that A occurs does not effect the likelihood of B occurring.

Two events A and B are dependent if A occurring has some effect on B occurring.

ex 1 (Similar to HW 1-4)

Determine if the following are independent or dependent.

- a) a father having brown eyes and his son having brown eyes **dependent**
- b) Getting a raise in salary and buying a new car **dependent**
- c) owning a beagle and having a high IQ **independent**
- d) tossing a coin and drawing a card **independent**

e) drawing a card, not replacing it, then drawing a second card
dependent

- * not replacing = dependent
- * replacing = independent

If A and B are independent, then
 $P(A \text{ and } B) = P(A) \cdot P(B)$

Prob of A occurring and then B occurring

If A and B are dependent then
 $P(A \text{ and } B) = P(A) \cdot P(B \text{ given } A \text{ occurred})$

ex 2 (Hw #8) Two cards are drawn from a standard 52 card deck one at a time without replacement. Find the prob of drawing:

a) 2 clubs (1 club and then another club)

13 clubs
in a deck

$P(\text{club}) \cdot P(\text{second club})$

$$\frac{13}{52} \cdot \frac{12}{51} = \frac{1}{17} = \boxed{0.058824}$$

b) a club and a heart

 $P(\text{club}) \cdot P(\text{heart})$ dependent events#clubs $\rightarrow \frac{13}{52}$ $\cdot$ $\frac{13}{51}$ $\leftarrow$ #heartstotal $\rightarrow 52$
#cards51 $\leftarrow$ total cards

bc I didn't replace the first card drawn

$$\text{Use calc } (13/52) * (13/51) = \boxed{0.063725}$$

ex 3 (HW #5 and #6)

A computer salesperson has a 43% chance of selling a computer. If she talks to 4 customers, find the probability that all 4 will buy computers.

Each customer is an independent event, so the probabilities are the same each time.

$$43\% = 43 \div 100 = 0.43$$

$$P(\text{sell comp}_{1^{\text{st}} \text{ cust.}}) \cdot P(\text{sell comp}_{2^{\text{nd}} \text{ cust.}}) \cdot P(\text{sell comp}_{3^{\text{rd}} \text{ cust.}}) \cdot P(\text{sell comp}_{4^{\text{th}} \text{ cust.}})$$

$$0.43 \cdot 0.43 \cdot 0.43 \cdot 0.43$$

$$= \boxed{0.03418}$$

ex 4 (Hw # 7 and #9)

A communications company has 8 satellites, 4 of which are sending a weak signal. If 2 are picked at random without replacement, find the prob that both are sending a weak signal.

$$P(1^{\text{st}} \text{ weak}) \cdot P(2^{\text{nd}} \text{ weak})$$

$$\frac{4}{8} \cdot \frac{3}{7} = \boxed{\frac{3}{14}}$$

depend.
events

1st one was weak and we didn't replace it

ex 5 (Hw #10)

A class has 14 men and 15 women all who submitted homework papers. Two different homework papers were selected at random, find the prob that both papers belonged to women.

dependent *

The papers are different so we assume they are chosen without replacement.

$$P(\text{woman}) \cdot P(\text{woman given the first was woman})$$

$$\frac{15}{29} \cdot \frac{14}{28} = \boxed{0.259}$$