PRECALC - BE | MONDAY 2-1-10

① Pg 857 Problem 42

- EXAM I THURSDAY
- IGW WEDS.
- Practice TUES.

Ch. 13-4 Probabilities of Compound Events

If events A and B are independent (they don't affect each other) the probability of both events occurring is the product (multiplication) of each individual probability.

Ex 1 p. 859

Standard deck ⇒ 52 cards
13 red diamonds
13 red hearts
13 black clubs
13 black spades
A 2 3 4 5 6 7 8 9 10 J Q K
(1) Face cards

Find P(face card) then P(Ace) with replacement

$$P(\text{face card}) = \frac{12}{52} = \frac{6}{26} = \frac{3}{13}$$

$$P(\text{Ace}) = \frac{4}{52} = \frac{1}{13}$$

$$P(\text{face card, Ace}) = \frac{3}{13} \cdot \frac{1}{13} = \boxed{\frac{3}{169}}$$

To find the probability of 2 dependent events, you STILL MULTIPLY, but you need to adjust the probability of the effect of ONE event ON ANOTHER.

EX 3 TASHA has 3 rock, 4 country, & 2 JAZZ CD's in Car. She pulls 2 at random. Find P(rock, rock). No replacement.

$$P(\text{rock first}) = \frac{3}{9} = \frac{1}{3}$$

$$P(\text{rock second}) = \frac{2}{8} = \frac{1}{4}$$

$$\therefore P(\text{rock, rock}) = \frac{1}{3} \cdot \frac{1}{4} = \boxed{\frac{1}{12}}$$

What are the odds of rock, rock?

$$\frac{\text{Successes}}{\text{failures}} \Rightarrow \boxed{\frac{1}{11}} \quad \text{since } \frac{1}{12} = \frac{\text{successes}}{\text{total}}$$

MUTUALLY EXCLUSIVE EVENTS ⇒ CANNOT happen AT SAME time.

If 2 events ARE MUTUALLY EXCLUSIVE, the

$$P(A \text{ or } B) = P(A) + P(B)$$

↑ ADD ↑

Ex ROLLING A 2 or 6 or ONE die

$$\Rightarrow P(2) = \frac{1}{6} \qquad P(5) = \frac{1}{6}$$

$$P(2 \text{ or } 5) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$$

CAN ALSO USE $\frac{2}{6}$ directly $\Rightarrow \frac{2 \text{ successes}}{6 \text{ total}}$

WATCH out for mutually inclusive events, events that have some outcomes that can occur both in the first and in the second event, to avoid counting them twice, you must subtract (once) their probability of occurring.

IF event A and B are mutually inclusive (they share events)

then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

(EX) Two dice, P(2 on roll one, sum of 6 or 7 on roll 2)

Mutually inclusive ⇒ 2, 4 or 2, 5

P(2, sum 6 or 7) ⇒ $P(2) = \frac{1}{6}$

$P(\text{sum is 6 or 7}) = \frac{11}{36}$

{4,2; 2,4; 3,3; 1,5; 5,1} ↑ 6 ways / 5 ways

$P(2+4 \text{ or } 2+5) = \frac{2}{36} = \frac{1}{18}$

$\therefore P(2, \text{sum 6 or 7}) = \frac{1}{6} + \frac{11}{36} - \frac{2}{36} = \frac{15}{36} = \boxed{\frac{5}{12}}$

{$\frac{6}{36}$}

Summary: Independent/dependent ⇒ multiply
Mutually Exclusive ⇒ Add
Mutually Inclusive ⇒ Add but subtract the common events.

Homework: Pg 863 # 4–9
