12-5 Adding Probabilities

"OR"

Simple event: An event that consists of only one event.
Compound event: An event that consists of two or more simple events.
Mutually exclusive events: Two events cannot occur at the same time.

Probability of Mutually Exclusive Events

If two events, A and B, are mutually exclusive, then the probability that A and B occurs is the sum of their probabilities. P(A or B) = P(A) + P(B)

Ex1. Keisha has a stack of 8 baseball cards, 5 basketball cards, and 6 soccer cards. If she selects a card at random from the stack, what is the probability that it is a baseball or a soccer card?

$$P(\text{baseball or soccer}) = \frac{8}{19} + \frac{6}{19} = \frac{14}{19} \approx .74$$

Ex2. There are 7 girls and 6 boys on the junior class homecoming committee. A subcommittee of 4 people is being chosen at random to decide the theme for the class float. What is the probability that the subcommittee will have at least 2 girls? order does not matter

$= P(\text{at least 2 Girls})$

$P(2G2B \text{ or } 3G1B \text{ or } 4G) = \frac{C(7,2)\cdot C(6,2)}{C(13,4)} + \frac{C(7,3)\cdot C(6,1)}{C(13,4)} + \frac{C(7,4)}{C(13,4)} = .78$

Ex3. Sylvia has a stack of playing cards consisting of 10 hearts, 8 spades, and 7 clubs. If she selects a card at random from this stack, what is the probability that it is a heart or a club?

$$P(\text{heart or club}) = \frac{10}{25} + \frac{7}{25} = \frac{17}{25} \approx .68$$

Ex4. The Film Club makes a list of 9 comedies and 5 adventure movies they want to see. They plan to select 4 titles at random to show this semester. What is the probability that at least two of the films they select are comedies?

$P(\text{at least 2 comedies})$

$P(2C2A, 3C1A, \text{or } 4C)$

$$\frac{C(9,2)\cdot C(5,2)}{C(14,4)} + \frac{C(9,3)\,C(5,1)}{C(14,4)} + \frac{C(9,4)}{C(14,4)}$$

$$= \frac{906}{1001} \approx .91$$

Inclusive events: Two events whose outcomes may be the same.

Probability of Inclusive Events
If two events, A and B, are inclusive, then the probability that A or B occurs is the sum of their probabilities decreased by the probability of both occurring.

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

overlap

Ex5. The enrollment at Southburg High School is 1400. Suppose 550 students take French, 700 take algebra, and 400 take both French and algebra. What is the probability that a student selected at random takes French or algebra?

$$P(\text{French or Algebra}) = \frac{550}{1400} + \frac{700}{1400} - \frac{400}{1400}$$
$$= \frac{850}{1400} \approx .61$$

Ex6. There are 2400 subscribers to an Internet service provider. Of these, 1200 own Brand A computers, 500 own Brand B, and 100 own both A and B. what is the probability that a subscriber selected at random owns either Brand A or Brand B?

$$P(\text{Brand A or Brand B}) = \frac{1200}{2400} + \frac{500}{2400} - \frac{100}{2400}$$
$$= \frac{1600}{2400} = .6$$

9 rings → 5 gold, 4 silver

(14) P(all gold or all silver)
$= P(GGG \text{ or } SSS)$

$$\frac{C(5,3)}{C(9,3)} + \frac{C(4,3)}{C(9,3)} = \frac{1}{6} = .1\overline{6}$$

(16) P(At least 1 Silver)
$= P(1S\,2G \text{ or } 2S\,1G \text{ or } 3S)$

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