

Fri March 20

ALGEBRA 2-tl

NOTES

12.4 Probability of Compound Events

Example 1 Two dice are rolled. How many ways can they land? $\frac{6}{1st} \cdot \frac{6}{2nd} = \underline{36 \text{ ways}}$

(a) Find the probability that the sum of the dice is 6 or 7.

6: (1,5)(5,1)(2,4)(4,2)(3,3) $P(6) = \frac{5}{36}$

7: (1,6)(6,1)(2,5)(5,2)(4,3)(3,4) $P(7) = \frac{6}{36}$

$P(6 \text{ or } 7) = \frac{11}{36} \quad (\frac{5}{36} + \frac{6}{36})$

* Two events are *mutually exclusive* if they have no common elements.
For mutually exclusive events, $P(A \text{ or } B) = P(A) + P(B)$.

(b) Find the probability that the sum of the dice is 8 or both numbers are equal.

8: (2,6)(6,2)(5,3)(3,5)(4,4) $P(8 \text{ or } =) = \frac{10}{36} = \frac{5}{18}$

equal: (1,1)(2,2)(3,3)~~(4,4)~~(5,5)(6,6) or $\frac{11}{36} - \frac{1}{36} = \frac{10}{36} = \frac{5}{18}$
duplicate total prob. (4,4) dup.

* If two events are not mutually exclusive, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.
↑ $P(\text{both})$

Example 2 Out of 200 pet owners, 103 owned dogs, 88 owned cats, 25 owned birds, and 18 owned reptiles.

(a) If 52 pet owners owned both a cat and a dog, find the probability that a randomly selected pet owner owns a cat or a dog.

$P(\text{cat}) + P(\text{dog}) - P(\text{both})$
 $\frac{88}{200} + \frac{103}{200} - \frac{52}{200} = \frac{139}{200}$

b) Find the probability that the pet owner did not own a reptile.

$200 - 18 = 182$ did not own a reptile
total owners reptile owners $\frac{182}{200} = \frac{91}{100}$
or $1 - P(\text{reptile}) = 1 - \frac{18}{200} = \frac{91}{100}$

The *complement* of event A (A') consists of all outcomes not in A. $P(A') = 1 - P(A)$.

Example 3 $P(A) = .3$, $P(B) = .55$, and $P(A \text{ or } B) = .65$.

(a) Find $P(A \text{ and } B)$. Are A and B mutually exclusive events?

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
 $.65 = .3 + .55 - \boxed{.20}$

A & B are not mutually exclusive

(b) Find $P(B')$.

$P(B') = 1 - P(B) = 1 - .55 = .45$