

Section 3.6: Independent Events

If the probability of event B does not depend on the probability of event A occurring, then these events are called independent events.

ex: tossing tails with a coin and drawing the ace of spades from a deck of cards

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

$$P(A \text{ and } B) = P(A) \times P(B)$$

Drawing an item and then drawing another item after replacing the first one results in independent events.

- In a situation with replacement, independent events are created.
- In a situation without replacement, dependent events are created.

Example 1:

What is the probability of rolling a 3 on a die and tossing heads on a coin?

$$\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$$

Example 2:

Jane encounters 2 traffic lights on her way to school. There is a 55% chance that she will encounter a red light at the first light, and a 40% chance that she will encounter a red light on the second light. If the traffic lights operate on separate timers, determine the probability that both lights will be red on her way to school.

$$0.55 \times 0.4 = 0.22$$

22%

Example 3: Suppose that $P(A) = 0.5$, $P(B) = 0.6$, and $P(A \cap B) = 0.3$

Are events A and B independent?

$$0.5 \times 0.6 = 0.3$$

yes

$A \cap B$

Section 3.5: Conditional Probability

If the probability of one