Section 9-7: Probability of Multiple Events

Independent Events:
When the outcome of the first event does NOT affect the outcome of the second event.

P(A and B) = P(A) • P(B)

Dependent Events:
When the outcome of the first event DOES affect the outcome of the second event.

P(A and B) = P(A) • P(BafterA)

In your sock drawer are 14 white socks, 6 black socks, and 7 blue socks.

TOTAL = 27

You wake up and don't turn on the lights and randomly grab a sock and put it on. You then randomly grab another sock and put it on your other foot.
Find each probability as a fraction.

Dependent Events

P(A) • P(BafterA)

1. P(Blue then a White) $= \frac{7}{27} \cdot \frac{14}{26} = \frac{98}{702}$

2. P(Black then a Black) $= \frac{6}{27} \cdot \frac{5}{26} = \frac{30}{702}$

You still have the following Halloween candy left in a bag:
5 Snickers bars, 3 pieces of gum, and 4 Milky Way bars.

TOTAL 12

1. You randomly grab one eat it then randomly grab another and eat it. Find this probability as a fraction:

Dependent Events

P(Snickers and Milky Way) $= \frac{5}{12} \cdot \frac{4}{11} = \frac{20}{132}$

2. You grab one at random, decide it's not one you want so you throw it back in and grab another. Find this probability as a fraction.

Independent Events

P(Gum and Gum) $= \frac{3}{12} \cdot \frac{3}{12} = \frac{9}{144}$

...and challenge "the myth that making profits and protecting the public interest are mutually exclusive goals"...

Mutually Exclusive Events:

When two events CAN'T happen at the same time.

Are studying for a test and listening to musich mutally exclusive events? — NO

Are reading a book and sleeping mutally exclusive? — Yes

Are being 5'3" tall and being able to dunk a basketball mutually exclusive? — NO

Mugsy Bogues was an NBA player at 5'3" tall and he could dunk the ball.

Is each pair of events mutually exclusive?

1. Getting an even number & a 5 when you roll a die. — Yes
2. Getting a multiple of 3 & an even number when you roll a die. - NO
3. Getting a prime number & an even number when rolling a die. — NO
4. Rolling a 2 & a 3 on a die. — Yes

Two events are NOT mutually exclusive if:

they CAN happen at the same time.

Is each pair of events mutually exclusive?

1. Driving your car and texting. NO
2. Driving your car and swimming. Yes
3. Two numbers add to 5 and have a product of zero. NO
4. Two numbers have an odd product and an odd sum. Yes

Probability of (A or B)

mutually exclusive
means
they CAN'T happen at the same time

If A and B ARE mutually exclusive:

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

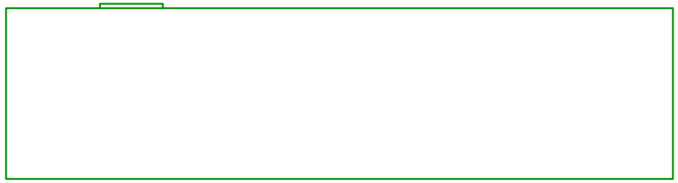
Probability of (A or B)

NOT mutually exclusive
means
the CAN happen at the same time

If A and B are NOT mutually exclusive:

P(A and B) = P(A) • P(B) (usually)

P(A or B)= P(A) + P(B) - P(A and B)



Find each probability as a fraction.

a) The probability that it snows today= $\frac{1}{100}$ and the probability that my car doesn't start today = $\frac{2}{75}$

these are NOT mutually exclusive

Find P(snows today or car doesn't start) =

$= \frac{1}{100} + \frac{2}{75} - \frac{1}{100} \cdot \frac{2}{75}$

$= \frac{75}{7500} + \frac{200}{7500} - \frac{2}{7500} = \frac{273}{7500}$

b) The probability that you score more than 10 points in the basketball game is $\frac{3}{8}$ and the probability that you don't score any pionts is $\frac{1}{6}$.

Find P(score > 10 points or score 0 points)=

these are mutually exclusive

$P = \frac{3}{8} + \frac{1}{6}$

$= \frac{9}{24} + \frac{4}{24} = \frac{13}{24}$

The probability that hitter strikes out is 12% and the probability that they get a hit is 30%. Find the probability that, in their next at bat, the hitter strikes out or gets a hit.

P(strike out or get a hit)=

these are mutually exclusive

$P = 12\% + 30\%$

$= 42\%$

The probability that I eat a Peanut Butter & Jelly sandwich today is 90%. The probability that I drink a Coke today is 85%. Find the following probability as a percent rounded to the nearest hundredth.

these are NOT mutually exclusive

P(eat PB&J or drink Coke) =

$90\% + 85\% - (.90)(85) =$ **98.5%**

OR

$90\% + 85\% - (90)(.85) =$