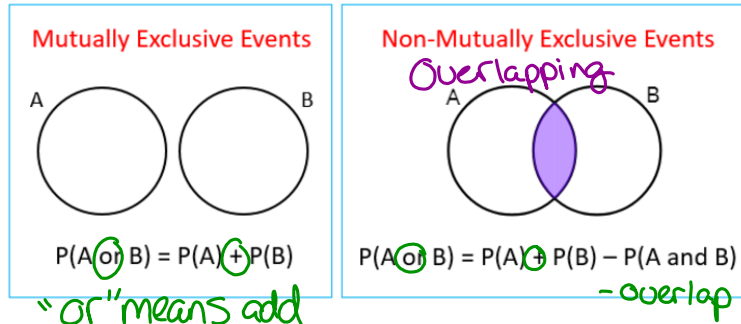


Mutually Exclusive vs. Inclusive (Overlapping) p.85



Probability of Mutually Exclusive Events - 2 events that cannot happen at the same time

Probability of Overlapping Events - events that can happen at the same time and have at least one common outcome

1. You roll 2 dice. What is the probability of...

a) P (sum is 4 or 5) <sup>add</sup> ME.

$$P(\text{sum is 4}) = \frac{3}{36} \quad P(\text{sum is 5}) = \frac{4}{36} \quad \frac{3}{36} + \frac{4}{36} = \frac{7}{36}$$

b) P (sum is 4 or Even) <sup>overlapping</sup>

$$P(\text{sum is 4}) = \frac{3}{36} \quad P(\text{sum is even}) = \frac{18}{36} \quad \frac{3}{36} + \frac{18}{36} - \frac{3}{36} = \frac{18}{36} = \frac{1}{2}$$

$$P(\text{sum is even}) = \frac{18}{36}$$

$$P(\text{sum is 4 or even}) = \frac{18}{36}$$

c) P (doubles or sum is a multiple of 3) <sup>overlap</sup>

$$P(\text{doubles}) = \frac{6}{36} \quad P(\text{mult of 3}) = \frac{12}{36} \quad \frac{6}{36} + \frac{12}{36} - \frac{2}{36} = \frac{16}{36}$$

$$\text{overlap (doubles + sum is mult. of 3)} = \frac{2}{36}$$

$$\frac{16}{36} = \frac{4}{9}$$

2. You have a basket of seven oranges & six bananas. One of the oranges & two of the bananas are rotten. You randomly select a piece of fruit. Find the probability that it is rotten or an orange.

$$P(\text{rotten}) = \frac{3}{13} \quad P(\text{orange}) = \frac{7}{13} \quad \frac{3}{13} + \frac{7}{13} - \frac{1}{13} = \frac{9}{13}$$

$$\text{overlap} \quad P(\text{rotten oranges}) = \frac{1}{13}$$

13 total  
7 oranges  
6 bananas  
3 rotten

3. Draw 1 card out of a deck. Find the probability...

a) P(ace<sup>+</sup> or face card) M.E.

$$P(\text{ace}) = 4/52$$

$$P(\text{face}) = 12/52$$

$$\frac{4}{52} + \frac{12}{52} = \frac{16}{52} = \frac{4}{13}$$

b) P(heart or face card) overlap

$$P(\text{heart}) = 13/52$$

$$P(\text{face}) = 12/52$$

$$P(\text{face cards that are hearts}) = 3/52$$

heart face overlap

$$\frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52}$$

$$\frac{11}{26}$$