3.3

The Addition Rule

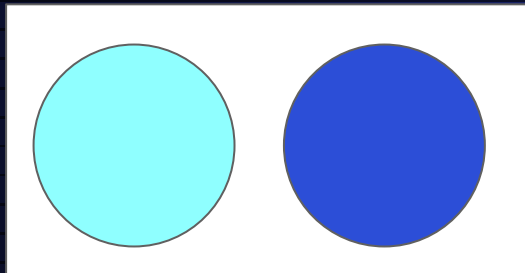# Mutually Exclusive Events
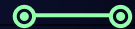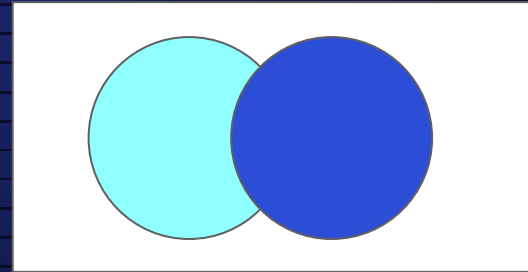
Two events A and B are mutually exclusive when they cannot occur at the same time.

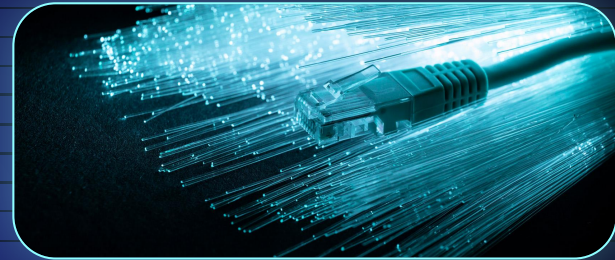If this is the case, P(A and B) = 0

VS

Mutually Exclusive VS. Not

Rolling a 3 and rolling a 4 when rolling a 6-sided die

Getting an ace and getting a king when drawing a card

Mutually Exclusive

Not

Getting a king and getting a heart

Rolling a 3 and rolling an odd number

The Addition Rule

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

For mutually exclusive events,
P(A or B) = P(A) + P(B)

Examples

You select a card from a
52-card deck. Find the
probability that you select a 4
or an ace

$$\frac{4}{52} + \frac{4}{52} \approx 0.154$$

You flip a coin and roll a
6-sided die. Find the
probability that you get a head
and a 6.

$$\frac{2}{6} + \frac{3}{6} - \frac{1}{6} \approx 0.667$$

Example

You have studied how much money (in dollars) you made each month and summarized it in the table to the right. Find the probability that the next month's sales are between $75,000 and $124,999

$$\frac{7}{36} + \frac{9}{36} \approx 0.444$$

Sales volume (in dollars)	Months
0–24,999	3
25,000–49,999	5
50,000–74,999	6
75,000–99,999	7
100,000–124,999	9
125,000–149,999	2
150,000–174,999	3
175,000–199,999	1

Example: You collect the blood types of 409 people (data summarized below). Find the probability that:

a) The next person you study has type O blood or type A blood

b) The next person you study has type B blood or a negative Rh-factor

		Blood type				
		O	**A**	**B**	**AB**	**Total**
Rh-factor	**Positive**	156	139	37	12	344
	Negative	28	25	8	4	65
	Total	184	164	45	16	409

a) $P(\text{O or A}) = \dfrac{184}{409} + \dfrac{164}{409} \approx 0.851$

b)

$P(\text{B or Negative}) = \dfrac{45}{409} + \dfrac{65}{409} - \dfrac{8}{409} \approx 0.249$