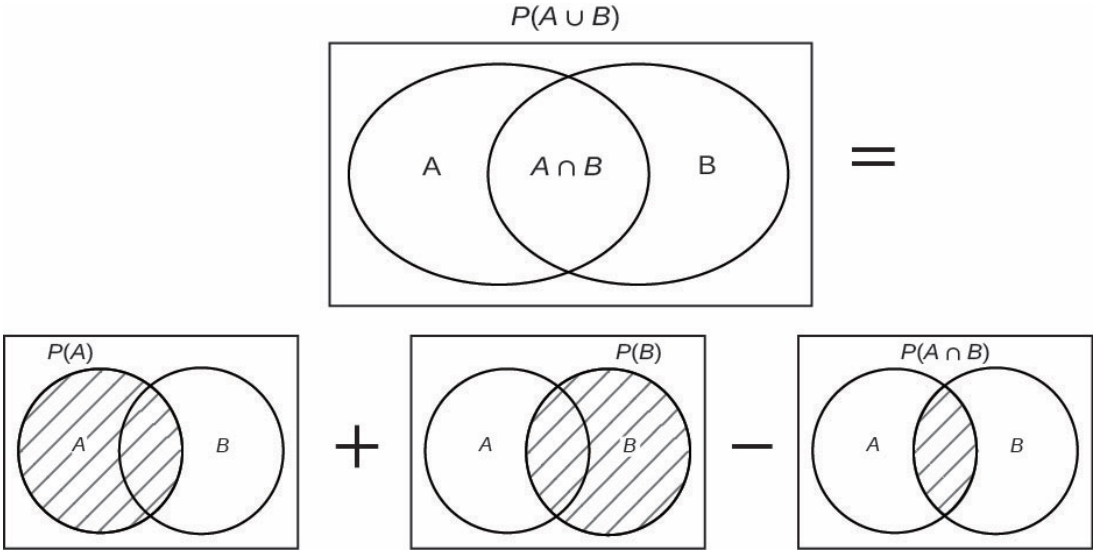
Laws of probability

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$



1. If P(A) = 0.6, P(B) = 0.4 and P(A ∪ B) = 0.7, find P(A ∩ B).

2. If P(A) = 0.5, P(B) = 0.4 and P(A ∪ B) = 0.8, find P(A ∩ B).

Independent event

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

The occurrence of each one of them does not affect the probability that the other occurs.

E.g. The probability of getting number 1 faces down in tossing a dice is independent to the probability of getting a head in throwing a fair coin.

1. If $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cup B) = 0.7$, are A and B independent events?

2. If P(A) = 0.3, P(B) = 0.6 and P(A ∪ B) = 0.8, find:

(a) P(A ∩ B)

(b) Are A and B independent events?

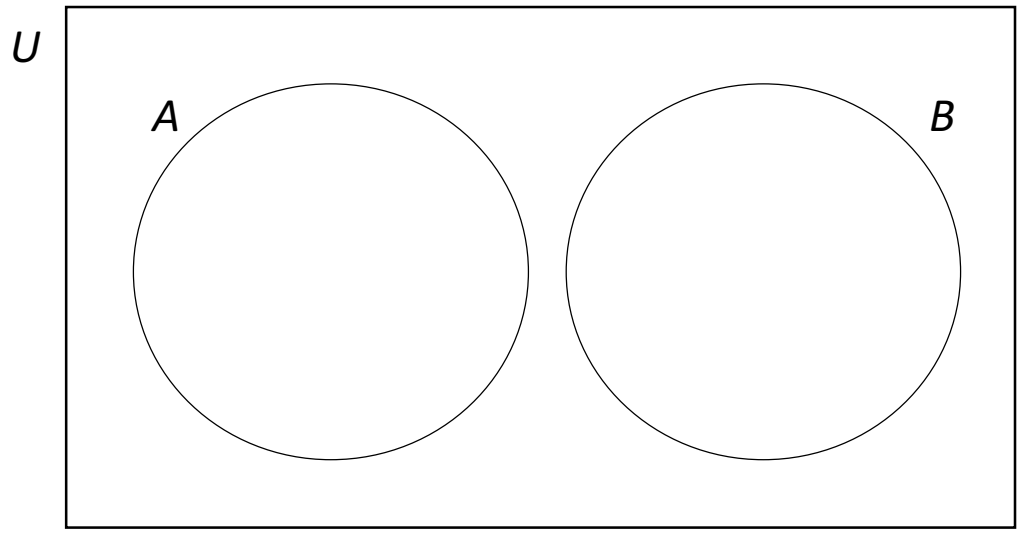
3. P(A) = 0.3, P(B) = 0.5 and P(A ∩ B) = 0.2.

Are A and B independent events?

Mutually exclusive

P(A ∪ B) = 0

P(A ∪ B) = P(A) + P(B)



1. Given that P(A) = 0.5, P(B) = 0.3 and P(A ∪ B) = k. Find k if

(a) A and B are independent

(b) A and B are mutually exclusive

2. Given that A and B are mutually exclusive events.
If $P(B) = 0.45$ and $P(A \cup B) = 0.8$, find $P(A)$.

3. Given that $P(X) = 0.35$ and $P(X \cup Y) = 0.8$, and that X and Y are mutually exclusive,
(a) Find $P(X \cap Y)$
(b) $P(Y)$

Exercise

1. Events A and B are independent with $P(A \cap B) = 0.2$ and $P(A' \cap B) = 0.6$.

(a) Find (B).

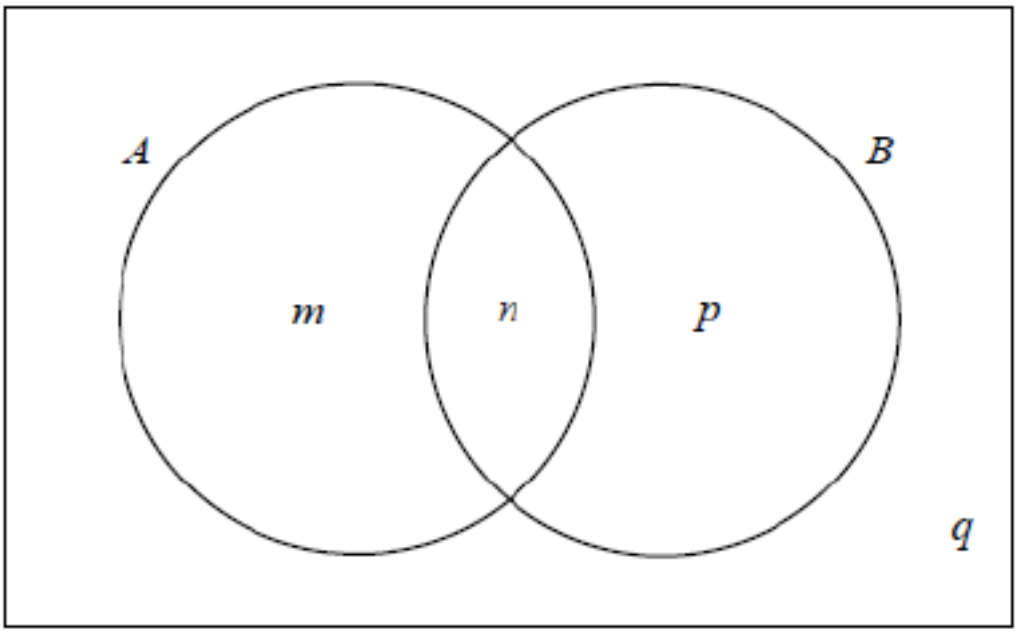
(b) Find $P(A \cup B)$.

2. Two events A and B are such that P(A) = 0.2 and P(A ∪ B) = 0.5.

(a) Given that A and B are mutually exclusive, find P(B).

(b) Given that A and B are independent, find P(B).

3. The Venn diagram below shows events A and B where P(A) = 0.3, P(A ∪ B) = 0.6 and P(A ∩ B) = 0.1. The values m , n, p and q are probabilities.



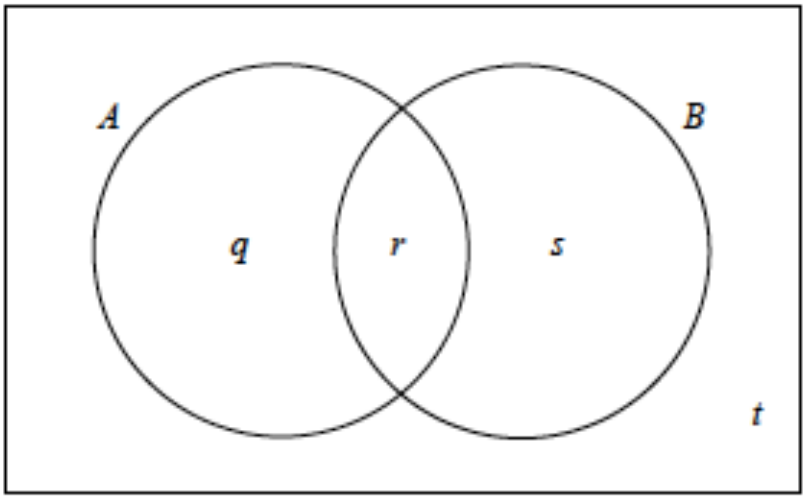
(a) Write down the value of n.

(b) Find the value of m, of p and of q.

(c) Find P(B').

4. Events A and B are such that P(A) = 0.3, P(B) = 0.6 and

P(A ∪ B) = 0.7.



The values q, r, s and t represent probabilities.

(a) Write down the value of t.

(b) (i) Show that r = 0.2.

(ii) Write down the value of q and of s.

(c) (i) Write down P(B').