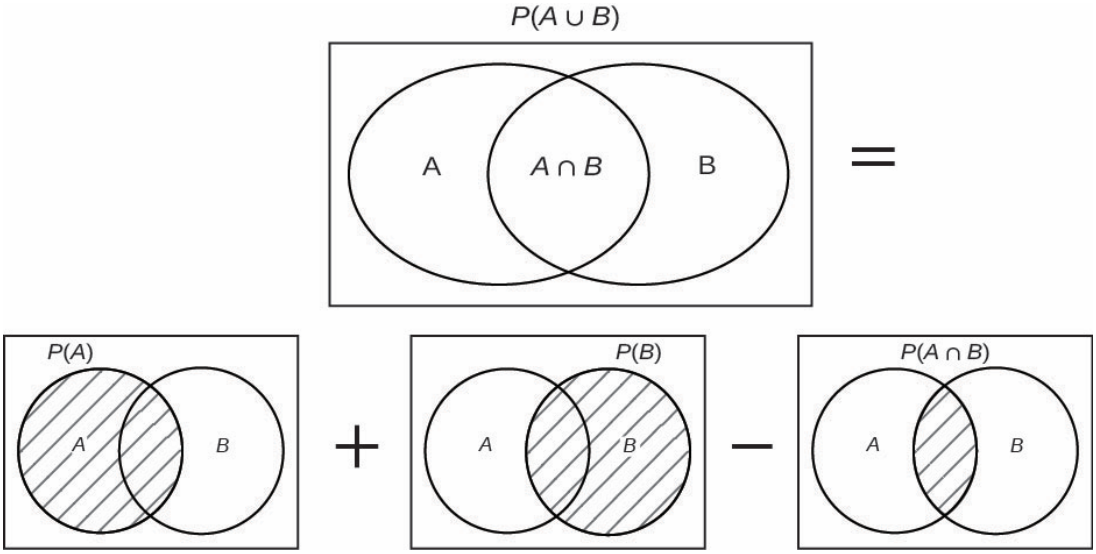
Laws of probability

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



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.

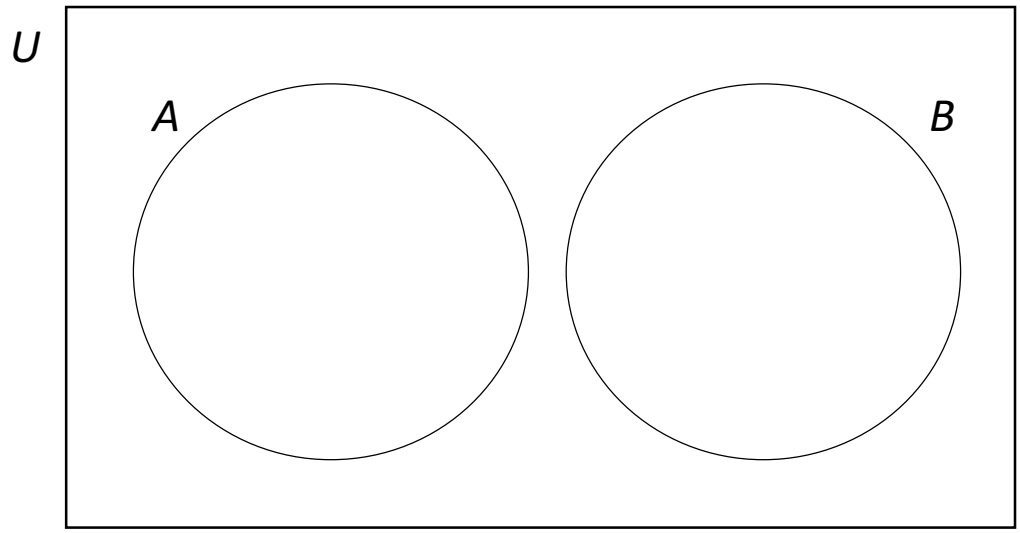
E.g. The probability of getting number 1 faces down in tossing a dice is independent to the probability of getting a head in throwing a fair coin.

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

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

Exercise

Paper 1

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).

Paper 2

1. Two events A and B are such that $P(A) = 0.2$ and $P(A \cup B) = 0.5$.

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

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

2. Let C and D be independent events, with P(C) = $2k$ and P(D) = $3k^2$, where $0 < k < 0.5$.

(a) Write down an expression for P($C \cap D$) in terms of k.

(b) Given that P($C \cap D$) = 0.162, find k.

(c) Find P($C'|D$).