

# Factsheet: Discrete uniform distribution

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## Summary

A factsheet for the discrete uniform distribution.

DUnif( $a = 1$ ,  $b = 6$ )

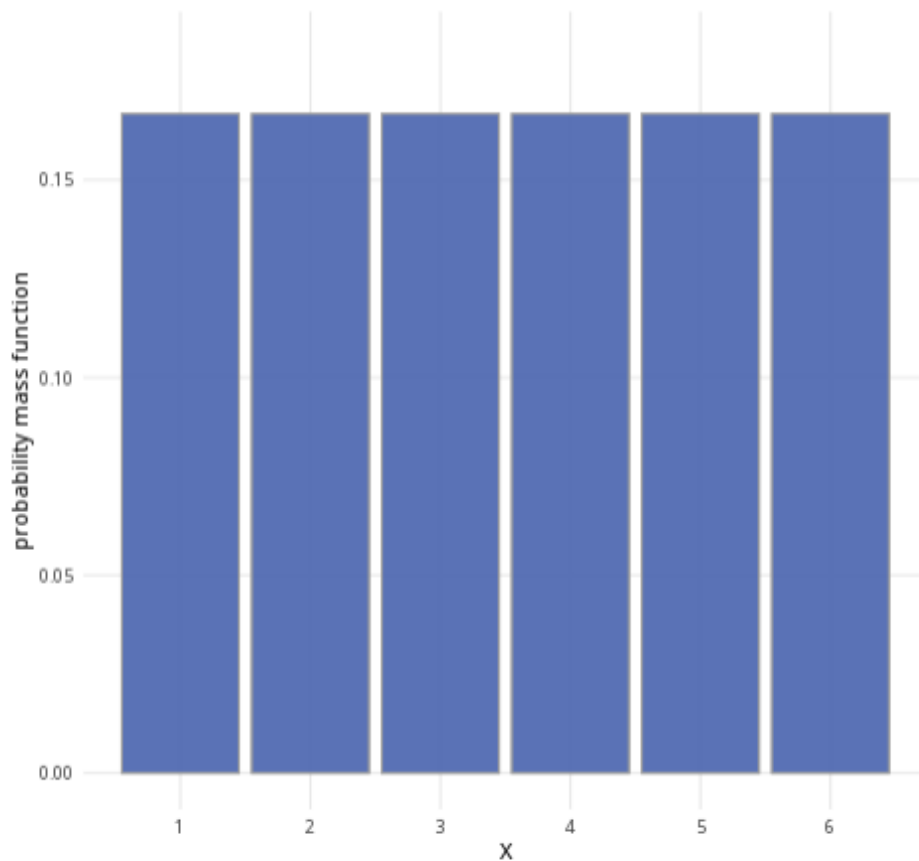


Figure 1: An example of the discrete uniform distribution with  $a = 1$  and  $b = 6$ .

**Where to use:** The discrete uniform distribution is used when all integer outcomes  $x$  in the interval  $a$  to  $b$  are equally likely.  $X$  is a random variable for integer outcomes  $x$  where for  $a \leq x \leq b$ , and the probability of each outcome  $1/n$ , where  $n = b - a + 1$ .

**Notation:**  $X \sim \text{Uniform}(a, b)$  or  $X \sim U(a, b)$

**Parameters:** The numbers  $a, b$  are integers where

- $a$  is the minimum value of an outcome
- $b$  is the maximum value of an outcome

There are  $n$  outcomes in total, with  $n = b - a + 1$ .

Quantity	Value	Notes
<b>Mean</b>	$\mathbb{E}(X) = \frac{a+b}{2}$	
<b>Variance</b>	$\mathbb{V}(X) = \frac{n^2-1}{12}$	
<b>PMF</b>	$\mathbb{P}(X = x) = \frac{1}{n}$	
<b>CDF</b>	$\mathbb{P}(X \leq x) = \begin{cases} 0 & \text{if } x \leq a \\ \frac{\lfloor x \rfloor - a + 1}{n} & \text{if } a < x < b \\ 1 & \text{if } x \geq b \end{cases}$	$\lfloor x \rfloor$ is the <b>floor function</b>

**Example:** You roll a fair six-sided die, where all outcomes (1, 2, 3, 4, 5, and 6) are equally likely. This can be expressed as  $X \sim U(1, 6)$ . It means 1 is the minimum value and 6 is the maximum value, where all discrete values of  $X$  for  $1 \leq x \leq 6$  are equally likely.

## Further reading

This interactive element appears in [Overview: Probability distributions](#).

## Version history

v1.0: initial version created 08/25 by tdhc.

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