

# Factsheet: Continuous uniform distribution

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## Summary

A factsheet for the continuous uniform distribution.

Unif( $a = -10.0$ ,  $b = 20.0$ )

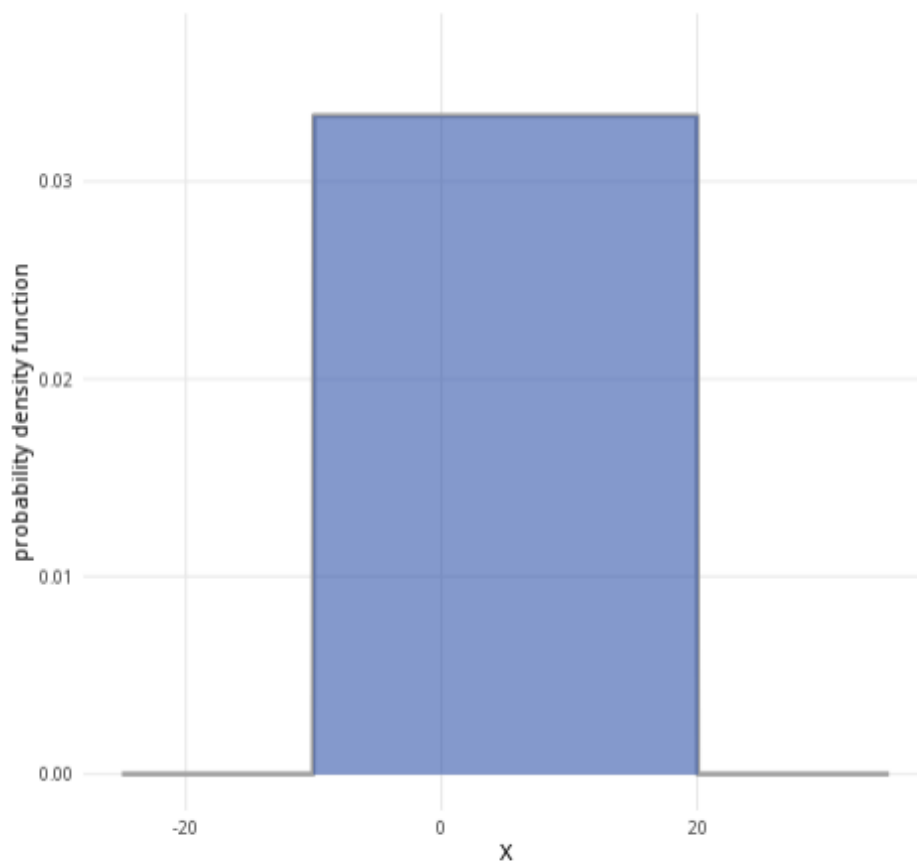


Figure 1: An example of the continuous uniform distribution with  $a = -10$  and  $b = 20$ .

**Where to use:** The continuous uniform distribution is used when all continuous values  $x$  in the interval  $a$  to  $b$  are equally likely. The random variable  $X$  represents the outcome.

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

**Parameters:** Two real numbers  $a, b$ , where

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

Quantity	Value	Notes
<b>Mean</b>	$\mathbb{E}(X) = \frac{a+b}{2}$	
<b>Variance</b>	$\mathbb{V}(X) = \frac{(b-a)^2}{12}$	
<b>PDF</b>	$\mathbb{P}(X = x) = \begin{cases} \frac{1}{b-a} & \text{if } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$	
<b>CDF</b>	$\mathbb{P}(X \leq x) = \begin{cases} 0 & \text{if } x < a \\ \frac{x-a}{b-a} & \text{if } a \leq x \leq b \\ 1 & \text{if } x > b \end{cases}$	

**Example:** A machine from Cantor’s Confectionery is programmed to chop long candy bars into pieces, each with a length between 30 millimetres to 50 millimetres. Due to variations in the machine, each continuous value between this interval is equally likely. This can be expressed as  $X \sim U(30, 50)$ . It means 30 is the minimum value and 50 is the maximum value, where all continuous values of  $X$  for  $30 \leq x \leq 50$  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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