

Factsheet: Continuous uniform distribution

Michelle Arnetta and Tom Coleman

Summary

A factsheet for the continuous uniform distribution.

$$\text{Unif}(a = -10.0, b = 20.0)$$

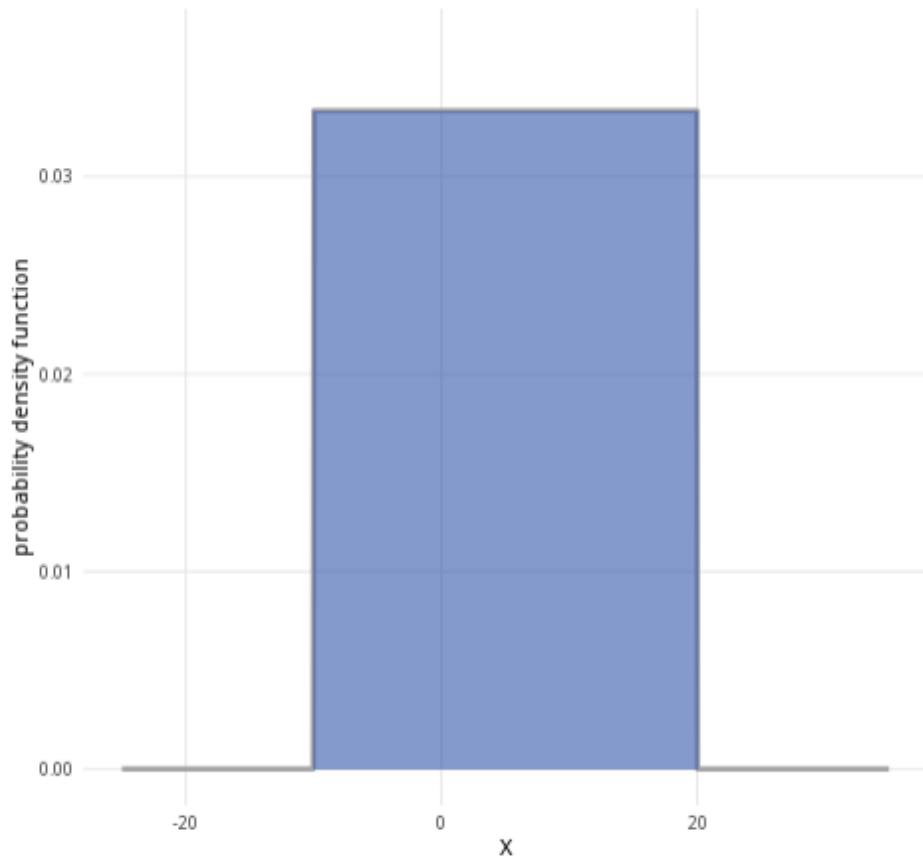


Figure 1: An example of the continuous uniform distribution with $a = -10$ and $b = 20$.

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

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.

[This work is licensed under CC BY-NC-SA 4.0.](#)