Factsheet: Continuous uniform distribution

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Summary

A factsheet for the continuous uniform distribution.

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

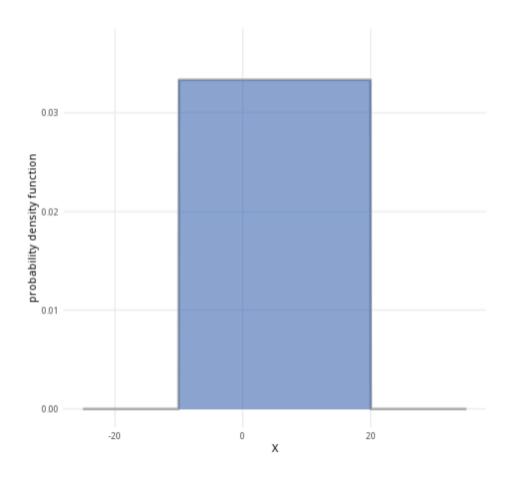


Figure 1: An example of the continuous uniform distribution with a=-10 and b=20.

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

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 $30 \le x \le 50$ 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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