Factsheet: Continuous uniform distribution

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Summary

A factsheet for the continuous uniform distribution.



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:** $X∼Uniform\left(a,b\right)$ or $X∼U\left(a,b\right)$.

**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** | $E\left(X\right)=\frac{a+b}{2}$ |  |
| **Variance** | $V\left(X\right)=\frac{\left(b−a\right)^{2}}{12}$ |  |
| **PDF** | $P\left(X=x\right)=\left\{\begin{matrix}\frac{1}{b−a}&if a\leq x\leq b\\0&otherwise\end{matrix}\right.$ |  |
| **CDF** | $P\left(X\leq x\right)=\left\{\begin{matrix}0&if x<a\\\frac{x−a}{b−a}&if a\leq x\leq b\\1&if x>b\end{matrix}\right.$ |  |

**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 $X∼U\left(30,50\right)$. 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.](../overviews/o-distributions.qmd)

## Version history

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

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