

The Normal Distribution

Essential information

Whilst the standardised Normal Distribution has a mathematical formula, derived by the German mathematician Carl Gauss in the early 19th century, in practical contexts this formula is not used as tables give sufficiently comprehensive values. Indeed these are now stored on some recently developed calculators (for example, the Casio *fx-991EX*).

- The standardised normal distribution, denoted by $N(0, 1)$ has mean 0 and standard deviation 1 and is bell-shaped
- The area under this curve has value 1
- Tables are provided to give the probability up to a certain value, z , as shown in the second diagram
- A normal distribution of mean μ and standard deviation σ , (i.e. $N(\mu, \sigma)$) can be transformed to the standardised normal distribution using the transformation

$$z = \frac{x - \mu}{\sigma}$$

- For a standardised normal distribution, about 95% lies ± 2 standard deviations and about 68% between ± 1 standard deviations of the mean

