The normal (or standard normal) reference distribution

Density functions for the normal distribution

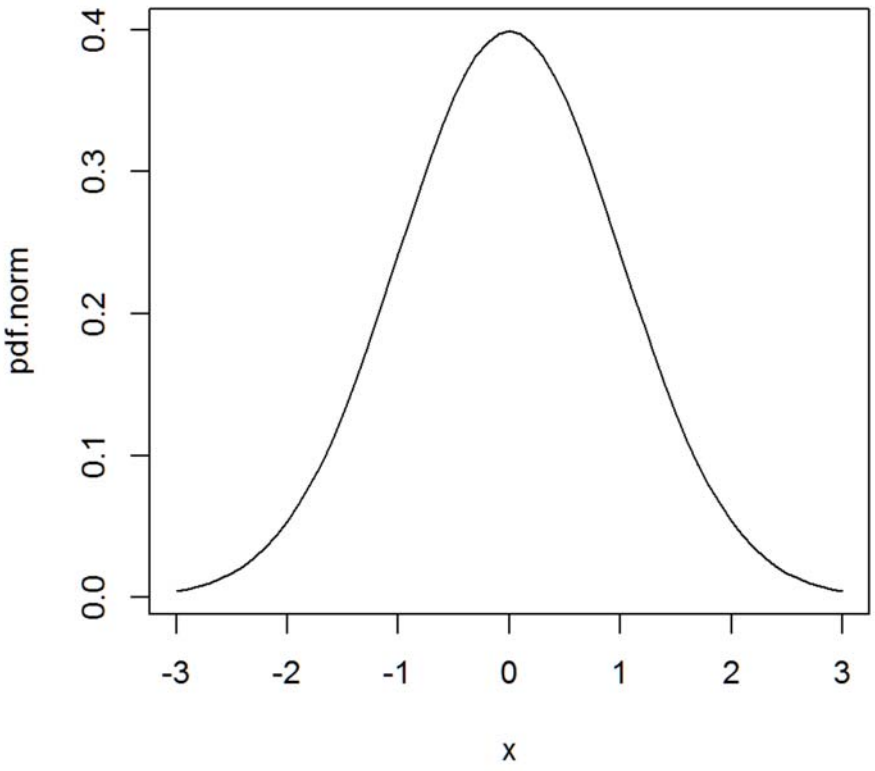
The standard normal distribution is widely used in inferential statistics, owing to its

- applicability (many processes are intrinsically normally distributed, and the central limit theorem assures us that sample means, in specific, and many processes that involve summation or integration, in general, are normally distributed)
- simplicity (it has a relatively simple shape, owing to the particular choice of values for its two parameters, mu and sigma)

The standard normal distribution is described by an equation and is represented by its:

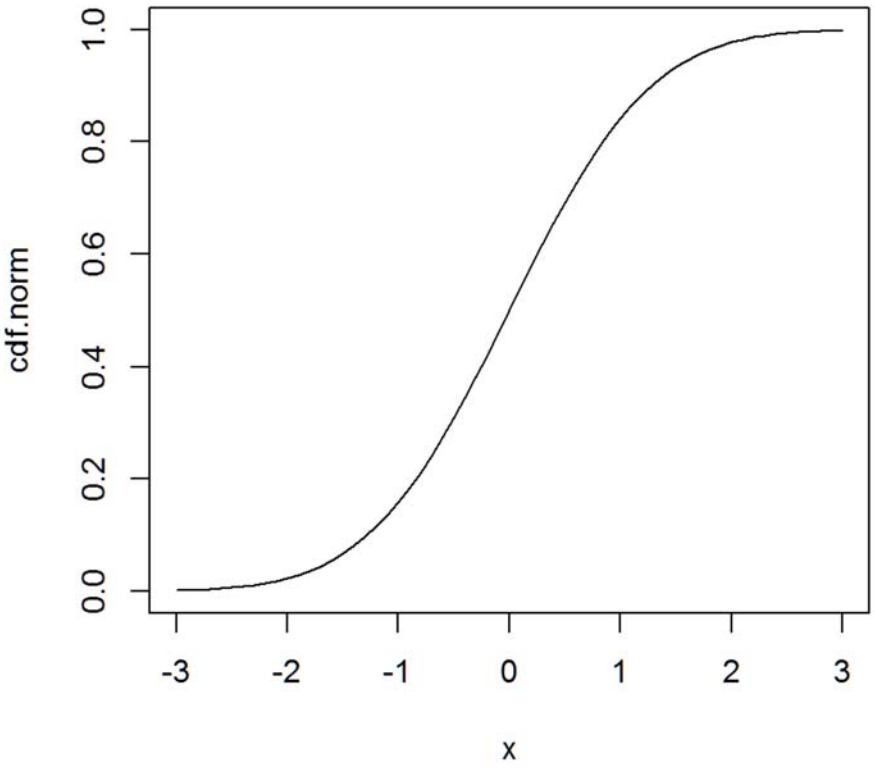
Probability density function (pdf) (R/S-Plus term is Density),

```
# probability density function
x <- seq(-3, +3, by=.1)
pdf.norm <- dnorm(x, mean=0, sd=1)
plot(x, pdf.norm, type="l")
```



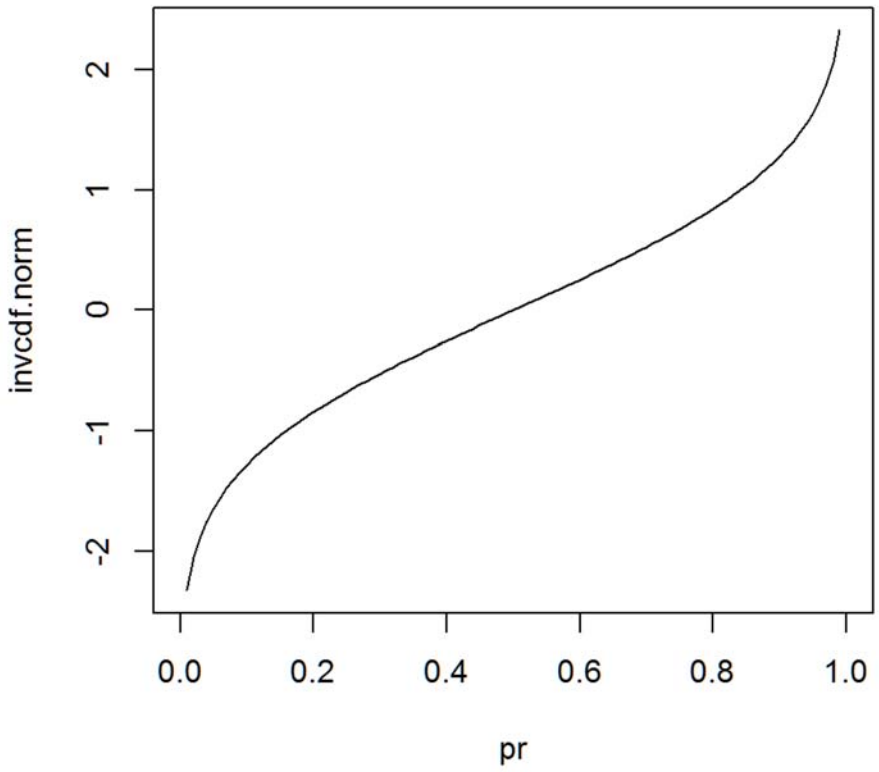
Cumulative density function (cdf) (R/S-Plus term is Probability), and

```
# cumulative density function
x <- seq(-3, +3, by=.1)
cdf.norm <-pnorm(x, mean=0, sd=1)
plot(x, cdf.norm, type="l")
```



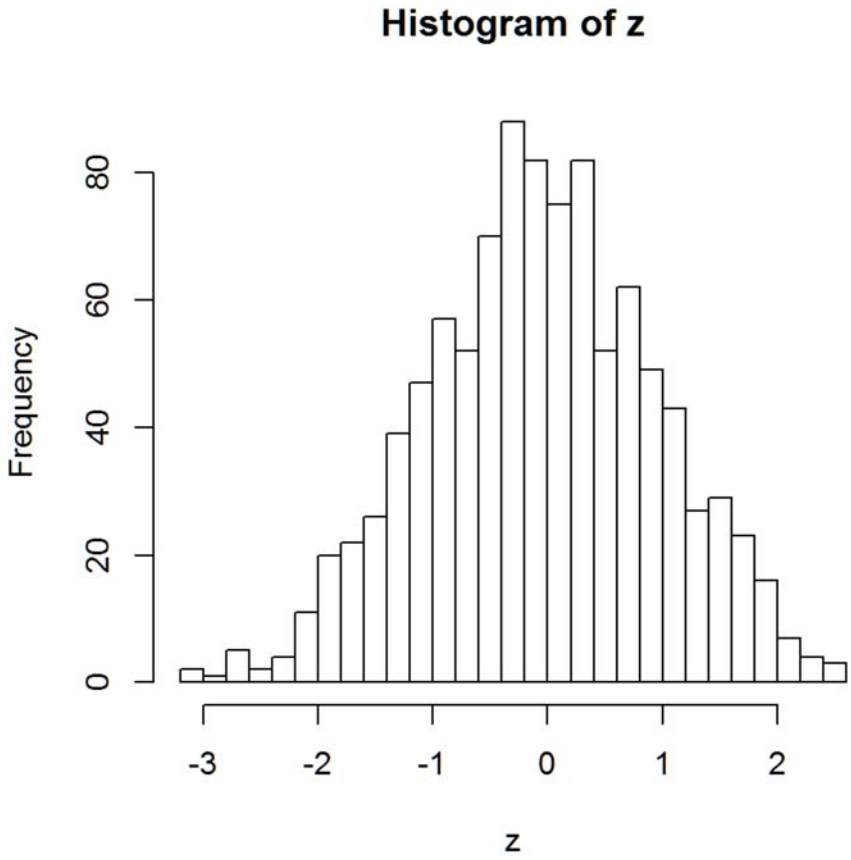
Inverse cumulative density function (invcdf) (R/S-Plus term is Quantile).

```
# inverse cumulative density function
pr <- seq(0, 1, by=.01)
invcdf.norm <- qnorm(pr, mean=0, sd=1)
plot(pr, invcdf.norm, type="l")
```

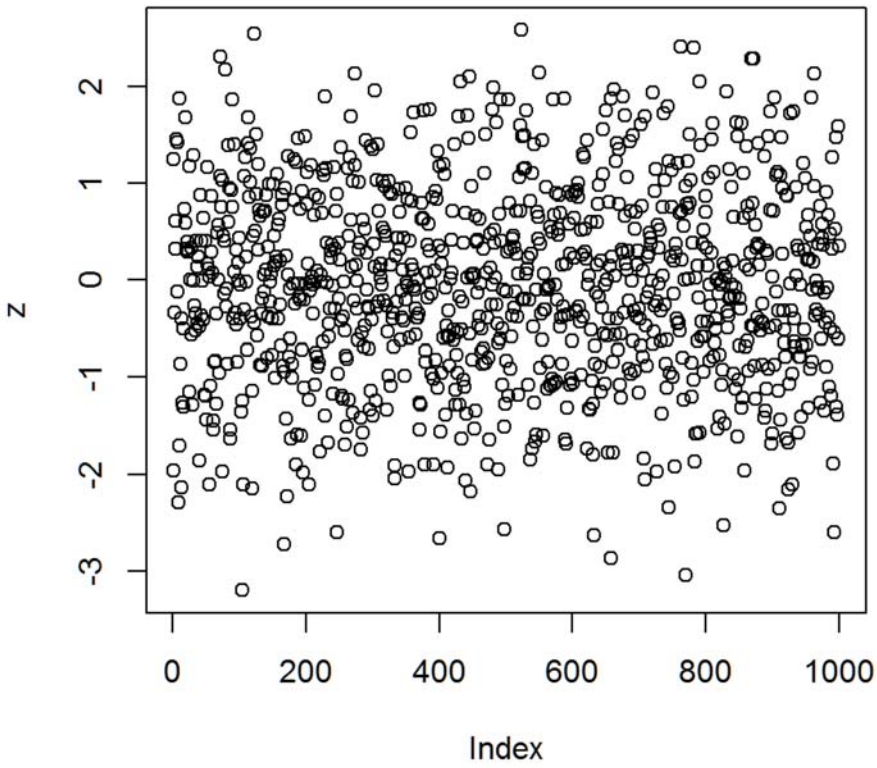


Random numbers drawn from the normal distribution can be obtained as follows

```
# normally distributed random numbers
z <- rnorm(n=1000, mean=0, sd=1)
hist(z, nclass=40)
```




```
plot(z)
```


z
-3
-2
-1
0
1
2
0
200
400
600
800
1000
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