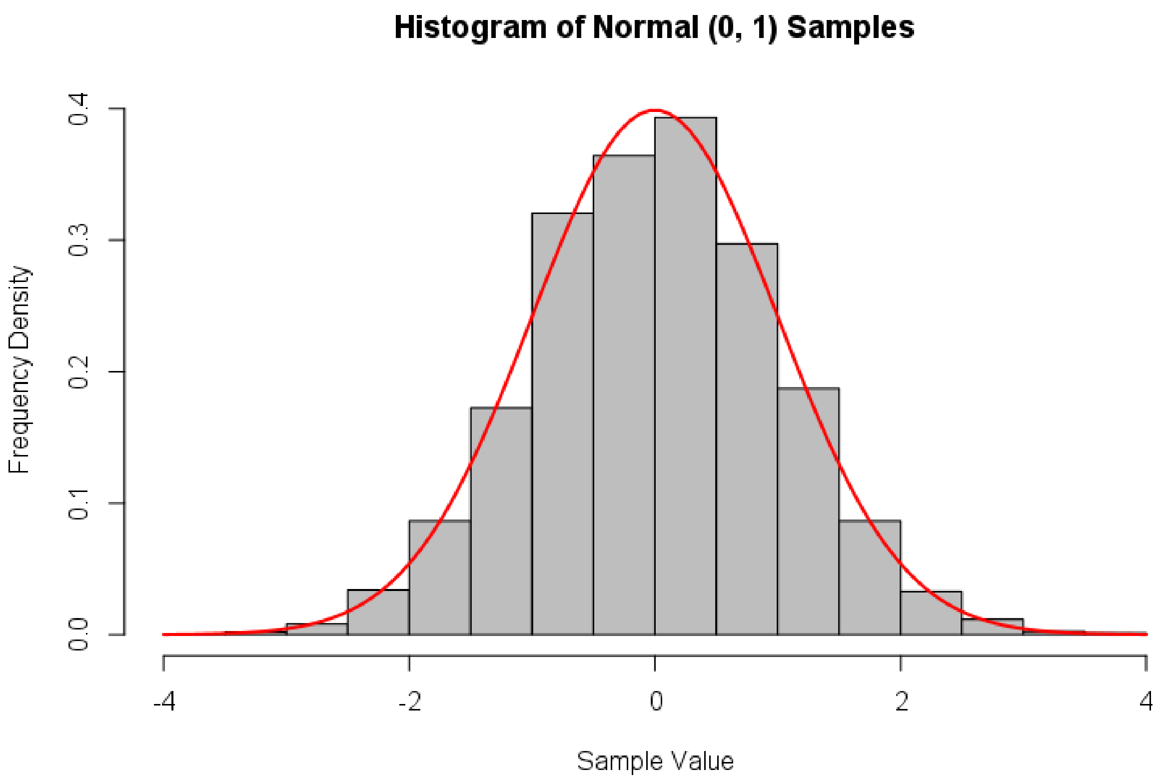
Generating Normal Random Variates

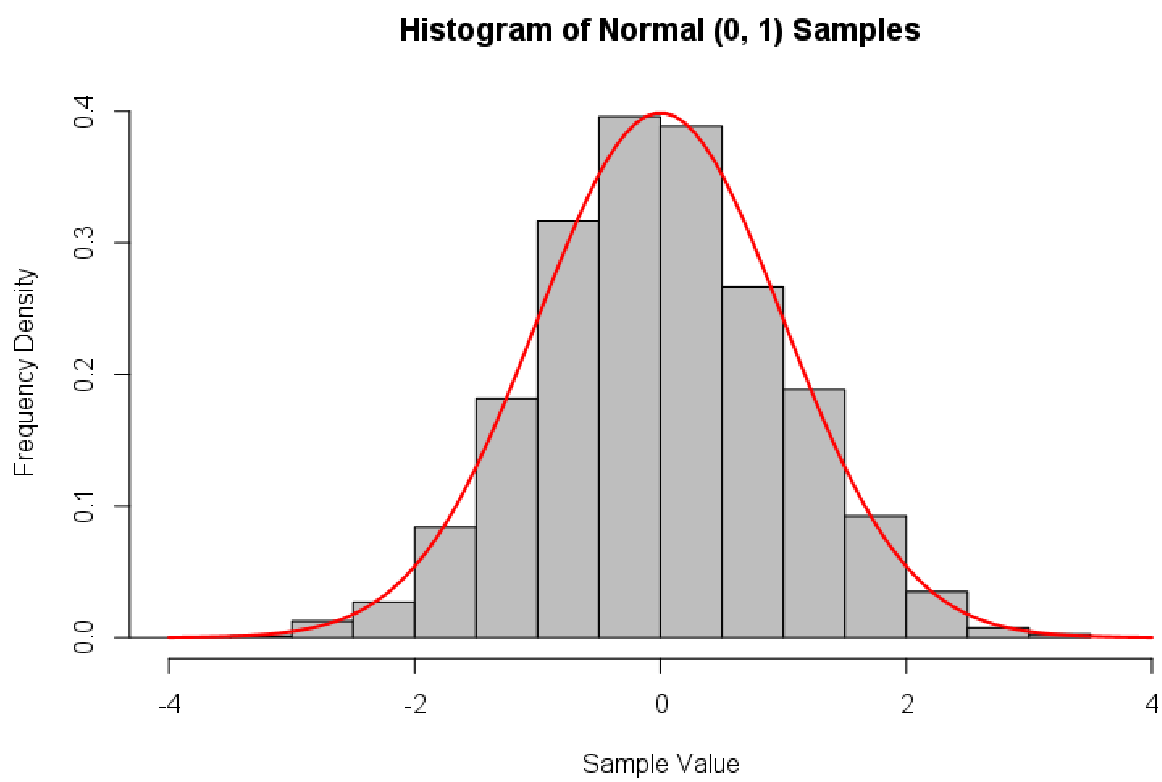
Sum of Uniform Variates:



If the number of uniform random variates or **`n`** (here: **n=5000**) is large, the fit looks reasonable since as **`n`** increases, the distribution of the sum of the uniform variates approaches the standard normal distribution in a very close approximation to it. The major drawback, however, is requiring a large number of uniform variates to produce a single normal variate which can be hefty on the computational aspect. If **`n`** is small, it strays from the standard normal distribution.

The range of the values generated by this particular method is the same as that of standard normal distribution i.e. $(-\infty, \infty)$ but in reality, the values are limited by the accuracy of the uniform number generator.

Box-Muller:



The Box-Muller method produces a very close approximation to the theoretical standard normal distribution with the same amount of samples i.e. **`n =5000`**.

This method is more efficient than the sum of uniform variates method since it uses two standard normal variates with a single pair of uniform variates which is contrary to the other method where one standard normal variate is produced through many uniform variates.

Just like the sum of uniforms method, the range of the values generated by this particular method is the same as that of standard normal distribution i.e. $(-\infty, \infty)$ but in reality, the values are limited by the accuracy of the uniform number generator.