THEORY

In order to determine the number of Monte - Carlo trials I use the variance of the mean value

$$Var[m_{r^{10}}] = E[\left(m_{r^{10}} - E[r^{10}]\right)^2] = E[\left(\sum r_i^{10} / n + nE[r^{10}] / n\right)^2] =$$

$$= E[\left(\sum (r_i^{10} - E[r^{10}]) / n\right)^2] = E[\left(\sum (\xi_i) / n\right)^2] = E[(\xi_1 + \xi_2 + \ldots)(\xi_1 + \xi_2 + \ldots)] / n^2 =$$

$$= \sum E[\xi_i^2] / n^2 + 2\sum E[\xi_i \xi_{i+1}] / n^2 + 2\sum E[\xi_i \xi_{i+2}] / n^2 + \ldots$$

The first term equals to the sum of population standard deviations divided by n^2
Other terms equal to zero with the assumption of statistical independence of ksi_i
In more detail:

$$E[\xi_i \xi_{i+k}] = E[(r_i^{10} - E[r^{10}])(r_{i+k}^{10} - E[r^{10}])] = E[r_i^{10} r_{i+k}^{10}] - \left(E[r^{10}]\right)^2$$

$$E[\xi_i \xi_{i+k}] = 0 \qquad \text{for} \qquad E[r_i^{10} r_{i+k}^{10}] = E[r_i^{10}] E[r_{i+k}^{10}]$$

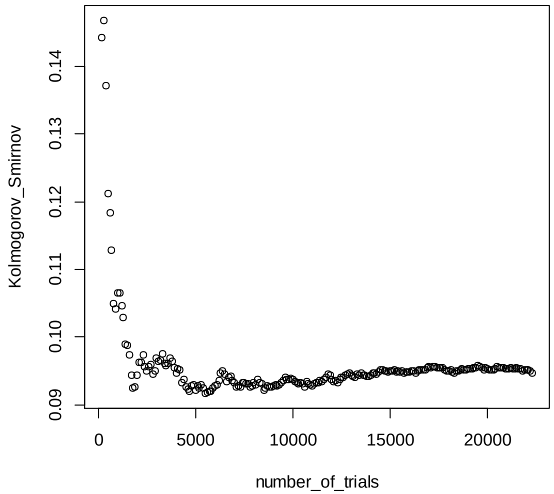
In general, other terms are not zero because overlapping returns imply statistical dependence of ksi_i.

$$E[r_i^{10} r_{i+10}^{10}] = E[\frac{P_{i+10} - P_i}{P_i} \frac{P_{i+20} - P_{i+10}}{P_{i+10}}] = \ldots$$

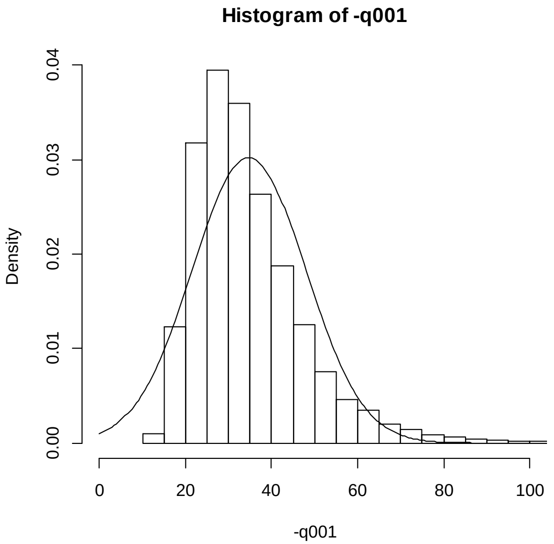
I did not proceed further. I define the stopping condition as:

$$\sqrt{Var[m_{r^{10}}]} / E[r^{10}] = \sigma_{population} / (\sqrt{n} E[r^{10}]) = 0.5\% / 100 = 0.005$$

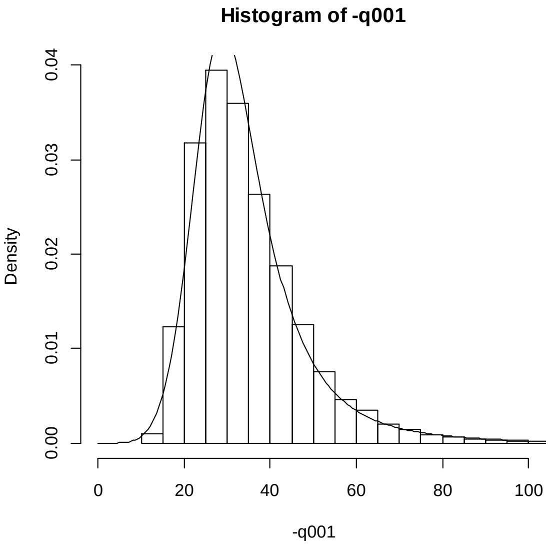
RESULTS



Kolmogorov Smirnov test for normal distribution of 0.01 quantile (q001). The defined above stopping condition provides well the stationarity.



However, normal distribution is not the best choice.



Burr distribution looks much better.