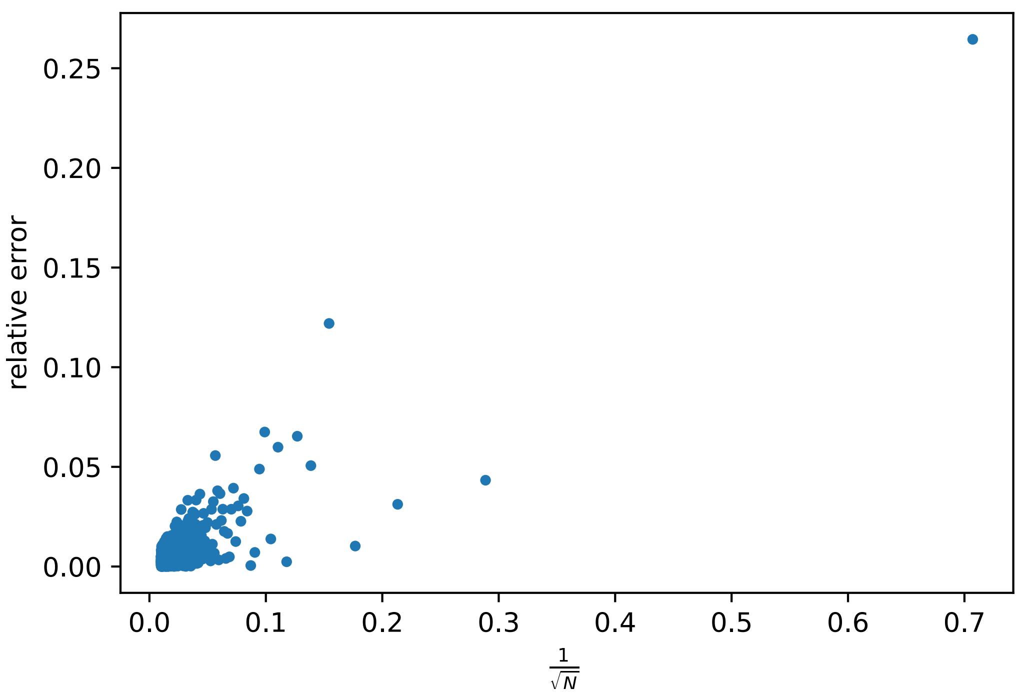
(1) Calculating the 10-dimensional integral using the limit definition of an integral would require 100^{10} calculations for 100 segments, which would require 10^{14} seconds or ~ 10^7 years. Using 1000 segments would require 1000^{10} calculations, and 10^{23} seconds, or ~10^{16} years to complete.

(2) $I_{n-D} = (b-a)(d-c)\ldots(\alpha-\gamma)\dfrac{\sum_i^N f(x_1, x_2, \ldots x_n)}{N}$

(3) For 1000000 samples, Numeric Approximation = 25.819041034064217, Analytic Solution = 25.833333333333332.

(4) Looking at the plot we can see as $\dfrac{1}{\sqrt{N}}$ gets small, or the sample rate approaches infinity, the relative error goes to zero. Also, the relative error decreases quite rapidly with increasing sample size.



(5) At a sampling size of 10000 or 10000 calculations, the numeric solution is accurate to the 1st decimal place, and the computation time is < 1 second, or 10^{14} orders of magnitude less time than the limit method would take to compute the same integral.

(6) Assuming a computation rate of 10^6 calculations per second, and 100 intervals per dimension, a 1D integral would take ~ 0.0001 seconds, and is more efficient than the MC method. A 2D integral would take ~ 0.01 seconds, and would be equal to the computation time required for 10000 samples of the MC method. A 3D integral would require ~ 1 second to complete, at which point a MC method of 10000 samples would be more efficient than the limit method.