

Assignment 4

In task (a) for this assignment 4, we are going to use output data analysis techniques for the six component stochastic system 2 mentioned in assignment 3. In particular, the task is to determine the number of replications required to estimate the mean $\mu = E(X)$ with a specified error or precision. For this assignment, we consider obtaining the approximations for required replication number for both absolute and relative error by using Z statistic.

Similar to assignment 3, the overall number of runs is at least 5000. For various numbers of runs, show the following,

For specified absolute error β : Sample mean, sample standard deviation, sample variance, half-length, $n_a^*(\beta)$

For specified relative error γ : Sample mean, sample standard deviation, sample variance, half-length, half-length/sample mean, $n_r^*(\gamma)$

For example, we may consider, $n = 50, 100, 200, 300, 400, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, \dots$

In task (b) for this assignment 4, we are going to utilize a variance-reduction technique (VRT) for the same task done in task (a). VRT is able to obtain greater precision for the same amount of simulating, or, alternatively, achieve a desired precision with less simulating. In particular, we are going to use Antithetic variates (AV).