Assignment 4: How fluctuations vary with population size

Repeat Assignment 1 (mutation without selection) in a slightly different way. Divide population of size N equally between two types of individuals A and B represented by the numbers 0 & 1. Define mutation rates u1 and u2. Use u1=0.003 and u2=0.001

1. Repeat each simulation for different population sizes N=50, 100, 200, 300, 400, 600, 800,1000, 5000 for N_T=100 trials
2. For each value of N, choose a time-step at which the system has equilibrated (use your results from Assignment 1 to make this choice). For that time step, calculate the mean frequency and variance of the frequency by averaging over N_T=100 trials. Use the type with the large equilibrated frequency.

$$< f >_{trials} = \frac{1}{N_T} \sum_{i=1}^{N_T} f \qquad \text{: Mean}$$

$$< (\delta f)^2 >_{trials} = < f^2 >_{trials} - (< f >_{trials})^2 \qquad \text{:Variance}$$

Plot a graph of Variance vs (1/N) and show that it is a straight line. This simulation is meant to show that fluctuations arising due to finite size of the population (quantified by variance) is *inversely proportional to population size (N).*

Submission Deadline: Feb. 11, 2020