

Exercise 1

Using Matlab generate a large number of samples of a random walk $X(t_n)$, that has the following properties:

- 1) Each sample starts from zero at $t_0=0$;
- 2) Consists of 1000 time steps
- 3) The probability at each step to go up or down is equal

Prove the following:

- a) $E[X(t_n)]=0$
- b) $\text{Var}[X(t_n)]=n$

The process is not ergodic

Hint: Use the rand function to generate random numbers uniformly distributed in $[0\ 1]$