

Exercise 32

Random walk simulation

Question 1

Write a program (matlab) which simulates a simple random walk with parameters p and q . p is the probability of a move upward (+1), q is the probability of a move downward (-1).

Question 2

Construct different plots of 100 iterations of the walk with: $(p, q) = \left(\frac{1}{2}, \frac{1}{2}\right), \left(\frac{1}{2}, \frac{1}{4}\right),$ (something, else).

In the following let $(p, q) = \left(\frac{1}{2}, \frac{1}{2}\right)$.

Question 3

Estimate the probability $f_b(n)$ of (14) p. 79 in Grimmett and Stirzaker, for $n = 20$ and $b = 10$.

Question 4

Calculate the probability $f_{10}(20)$ by applying (15) p.79.

Question 5

Calculate the frequencies of the last visit to the origin from $n = 20$ for 1000 replications of the random walk.

Question 6

Compare the empirical frequencies with the distribution of 3.10.19 (p.80). You can quantify the comparison by a chi-square test.