1 Monte Carlo Simulation

(1) In the lecture we outlined the procedure to simulate a random walk. Generate some `MatLab` code that will carry out this procedure. Focus only on the steps shown in the lecture, don't worry about all the other details.

(2) Use the code `montesim01` from `Teams` to simulate a random walk. Use $n = 10$ and $r = 50$. Do you discover any modifications that need to be made to the code? If so, make them and run your code again. Were you able to solve any issues that arose?

(3) Convert box 3.3.1 in the course notes to `MatLab` code.

(4) In the course notes, we find that a *universal* scaling emerges,

$$\frac{\langle d \rangle}{\lambda} \approx N^q$$

where N is the number of collisions, λ is the mean free path and q a parameter. Write `MatLab` code to generate a plot of $\langle d \rangle / \lambda$ vs N. Set $\lambda = 1$. Vary the number of collisions fron 0 to 500.

(5) Now modify your code to plot $\log(\langle d\rangle/\lambda)$ vs $\log(N)$. Use your fitting routine to find the value of q. Does the mean free path play any role in the value of the parameter, q.