Random Walk Algorithms: Homework 6

You can answer the following questions either analytically, or by writing and running code.

- 1. Consider a game A which consists of flipping a coin with probability 1/2 of landing head up, in which case you win \$1; if it lands tail up you lose \$1. Thus, if W_t is your wealth after playing t times, $\{W_t\}$ is a random walk on \mathbb{Z} . If $W_0 = 0$, what is $\mathsf{E}[W_{100}]$?
- 2. Now consider a game B which has two coins, B_1 and B_2 . The probability of B_1 landing head up is 1/10 and the probability of B_2 landing head up is 3/4. On play t, if $W_{t-1} \equiv 0 \pmod{3}$ you must flip B_1 ; otherwise you must flip B_2 . Again you win \$1 if the coin you flip lands head up; otherwise you lose \$1. In this case, $\{W_t\}$ is an *inhomogeneous* random walk on \mathbb{Z} . If $W_0 = 0$, what is $\mathsf{E}[W_{100}]$?
- 3. Finally, suppose you play these games in the order AABB. If $W_0 = 0$, what is $\mathsf{E}[W_{100}]$? Compare your result with those in problems 1 and 2.