

## Part 1

$W_t := W(t, \omega)$  a brownian motion. Discretize this and approximate as a random walk, then  
 $dW_j := W(t_{j+1}, \omega) - W(t_j, \omega)$ ,  $dW_j \in \{-h, +h\}$ , with  $t_j = h \cdot j$ ,  $P(dW_j = +h) = P(dW_j = -h) = \frac{1}{2}$ .  
Then  $t_0 = 0$ ,  $W_{t_k} = \sum_{j=1}^k dW_j$

Implementation:

Let  $y_j = \{1 \text{ if } dW_j = +1, 0 \text{ if } dW_j = -1\}$ , then  $dW_j = 2h y_j - h$ ,  $W_{t_k} = \sum_{j=0}^k (2h y_j - h) = -k \cdot h + 2h \cdot \sum_{j=0}^k y_j$ , so this looks like a binomial random variable.