Assignment # 4

**Note:** For questions 1 to 3, the code has been provided to edit. For question 4, the algorithm to calculate the average distance for a particular step size is provided in the book. Provide the source code (in any language of your choice) and the screenshot of the running program for each question.

1. a. Revise the code of randomWalkPoints to have the entity go in an easterly direction (incrementing x) with probability of 30% and in a westerly direction (decrementing x) with probability of 70%.

b. Revise the code of Part a, to have the entity go in a northerly direction (incrementing y) with probability of 45% and in a southerly direction (decrementing y) with probability of 55%.

1. Revise the code of randomWalkPoints to have the entity go in a N, S, E, or W direction with probabilities of 20%, 30%, 45%, or 5%, respectively.
2. Develop code for Exercise 1 and run the simulation for 50 time steps. Include this code in a loop that runs the simulation 1000 or more times. Have the segment return the portion of time the entity ends on the 50th step in each of the four quadrants, NE, NW, SE, and SW.
3. Develop code to obtain a list of average distances covered for random walks of step sizes from 1 to 50. Then, using the data the program generates, determine a relationship between the number of steps, n, and average distance covered in a random walk. Plot the graph between the number of steps and average distance covered for each step.
4. A hiker without a compass trying to find the way in the dark can step in any of eight directions (N, NE, E, SE, S, SW, W, NW) with each step. Studies show that people tend to veer to the right under such circumstances. Initially, the hiker is facing north. Suppose at each step probabilities of going in the indicated directions are as follows: N, 19%; NE, 24%; E, 17%; SE, 10%; S, 2%; SW, 3%; W, 10%; NW, 15%. Develop a simulation to trace a path of a hiker, and run the simulation a number of times. Describe the results. (Note that other than at the initial step, this simulation simplifies the problem by ignoring the direction in which the hiker faces.)