NOVA SCHOOL OF BUSINESS & ECONOMICS

2494 - COMPUTATIONAL THINKING & DATA SCIENCE

2019-20, Spring Semester

In-class Exercises

RANDOM WALK

1. Reconsider the drunkard problem. Suppose now that we have two other drunkards. The first one can move in the following directions: (1,0), (-1,0), (0,1) and (0,-2). The second one moves only for East and West: (1,0) and (-1,0).
   Simulate several random walks for each one of the three drunkards and compare their mean distance between their last position and origin.
2. Simulate a random walk for each one of the three drunkards and plot their walks.

MONTE CARLO SIMULATION

3. Consider the Craps Game:
   The **shooter** chooses between making a "pass line" or a "don't pass line" bet.
   - **Pass line:** shooter wins if the first roll is a natural" (7 or 11) and loses if it is a "craps" (2, 3 or 12). If some other number is rolled, that number becomes "point" and the shooter keeps rolling. If the shooter rolls the point before rolling a 7, the shooter wins. Otherwise the shooter loses.
   - **Don't pass line:** shooter loses if the first roll is 7 or 11, wins if it is 2 or 3, and ties (a "push") if it is a 12. If some number is rolled, that number becomes the point and the shooter keeps rolling. If the shooter rolls a 7 before rolling the point, the shooter wins. Otherwise the shooter loses.

   Observation: Imagine that you bet $1 and win; you'll gain $1. In such situation, the Return on Investment (ROI) can be computed as: (#wins – #losses)/#bets