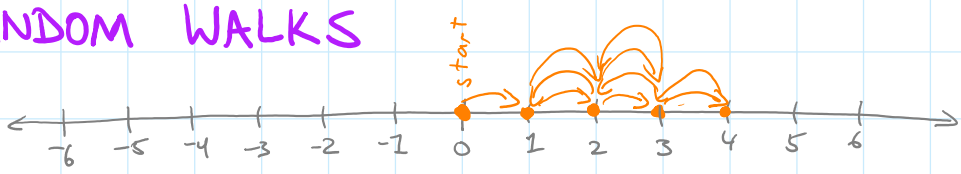
# MATH 242: Wednesday, April 15

## TODAY:

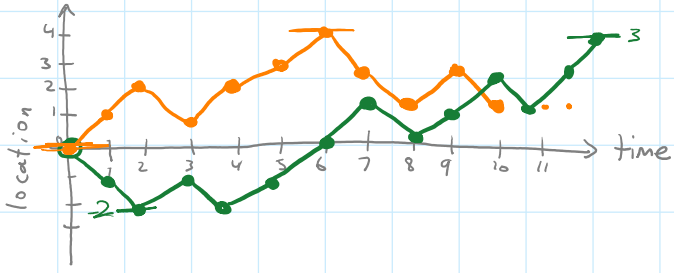
- Note about move() for Trouble simulation
- Introduce random walks
- Applications of random walks
- Questions about random walks

## RANDOM WALKS




steps: 1, 1, -1, 1, 1, 1, -1, -1, 1, -1

locations: [0, 1, 2, 1, 2, 3, 4, 3, 2, 3, 2]



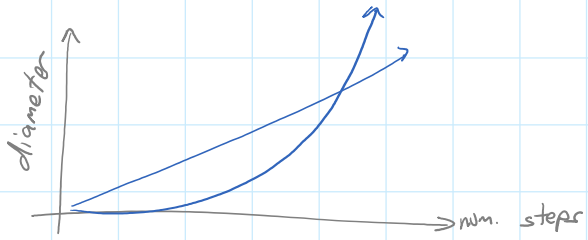

One-dimensional simple symmetric random walk

## APPLICATIONS OF RANDOM WALKS

- Economics: stock market, exchange rates
- Physics: diffusion, Brownian motion
- Ecology: biodiffusion, animal movements
- Polymers: a polymer molecule can be modeled as a random walk

# QUESTIONS

- The DIAMETER of a random walk is the difference between the max and min locations in the walk.
  - What is the average diameter of a random walk?
  - How does the diameter depend on the number of steps?




- Does the random walk return to the origin?
  - What is the probability of this?
  - How often does it return to the origin?
- What is the distribution of positions of the random walk?
  - After 100 steps, where am I likely to find the random walk?


- What other questions would you like to ask about random walks?