

MATH 242 — 14 November 2025

RANDOM WALKS

What do you observe?

What do you wonder?

What would the random walk look like if the steps were weighted?

What if there were no bounds?

Would it eventually return to the origin?

Hypothesis: If you run this until some stopping point, the average stopping point would be close to zero.

How long would it take to fill a given area? Would it even fill at all if there were no boundaries?

What would be the probability to fill the big square with little squares?

What would be the average number of steps until it goes in a new direction?

How much do the initial movements affect the entire trajectory?

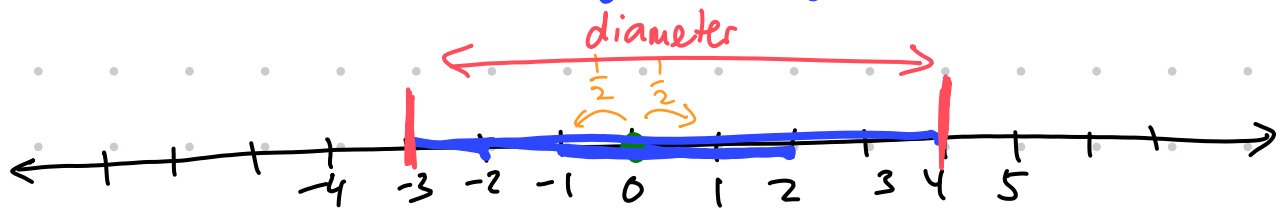
What would this look like in 3 dimensions?

How many times does it decide to go in the same direction?

What if we restrict to not repeat paths? Would it be faster to fill up the square?

How often a bigger square appears compared to a smaller square?

1-dimensional random walks



Start at origin.

At each time step, move left/right with probability $\frac{1}{2}$.

Simple random walk: integer position

Symmetric: 50% left, 50% right

Investigate: diameter of a random walk

Python functions: `min()` `max()`

We want to make a plot like this:

