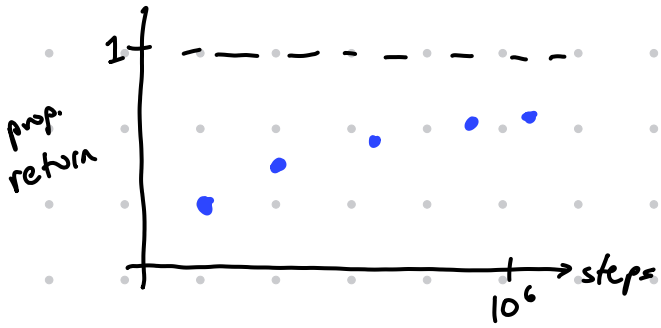
MATH 242 — 4 April 2026

RANDOM WALKS

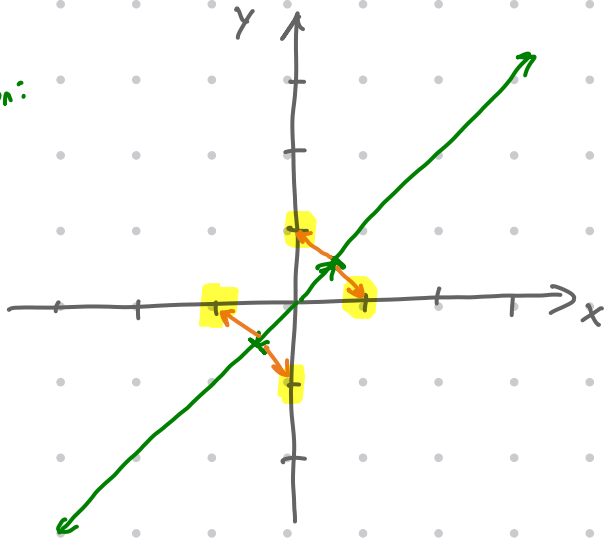
1D: Simple Symmetric random walks are recurrent:
they return to the origin (in fact, to every integer point)
infinitely many times

reason: $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ diverges

2D: Also recurrent, but it might take a long time to see this



reason:



$\sum_{n=1}^{\infty} \frac{1}{n}$ diverges

3D: Are these also recurrent?

4D and higher:

Transient: they don't return to the origin with probability 1.