

MATH 242: Friday, May 8

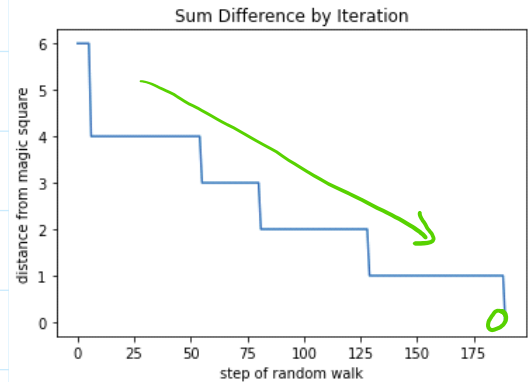
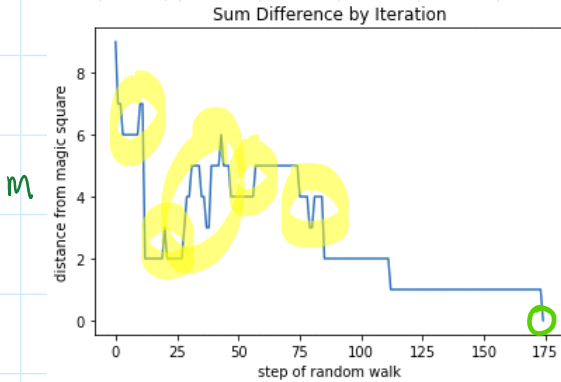
TODAY:

- Remarks about magic square problem:
 copying Numpy arrays and plots of function to optimize
- Traveling Salesperson Problem (TSP)

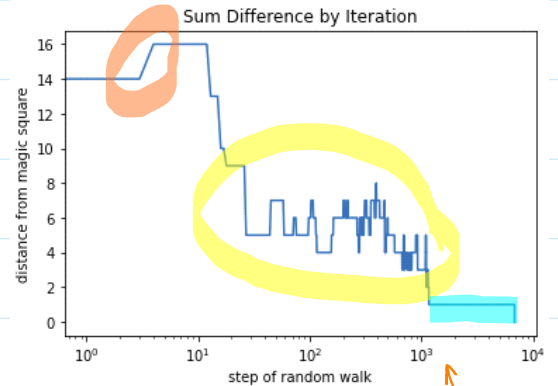
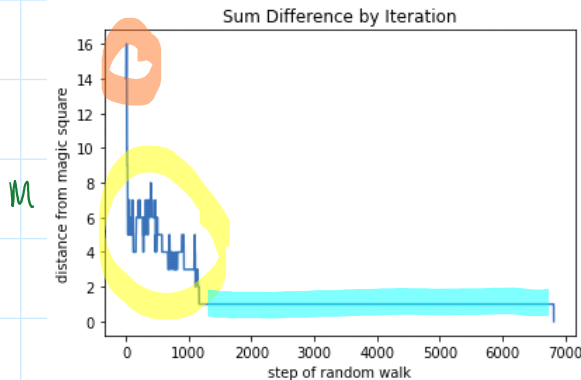
Minimize $m(\text{state})$

tells us how far the state is from a magic square
 Say $m(\text{state}) = 0$ iff state is a magic square.

3x3 squares:



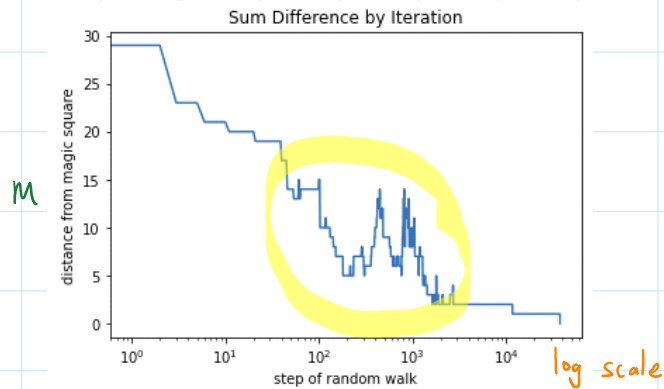
4x4 square:



plt. xscale("log")

log scale

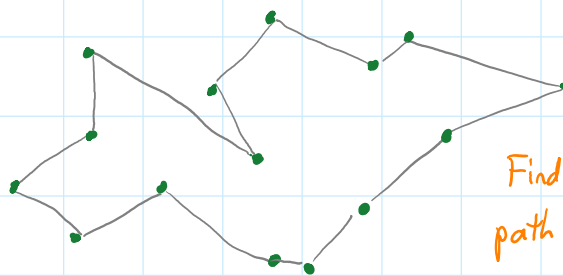
5x5 square:



TRAVELING SALES PERSON PROBLEM:

Start with N points in a plane:

Number of possible paths:
 $(N-1)!$



$N=15$

Finding the shortest path is hard in general!

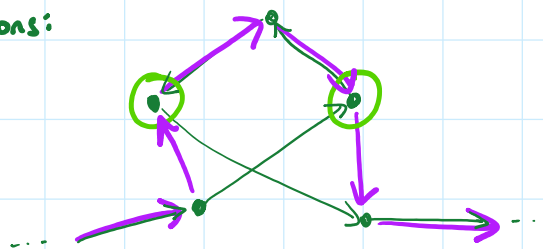
NP-Complete

Using simulated annealing to "solve" the TSP:

states: a path connecting all N points

function to minimize: length of the path

transitions:



see TSP notebook on the course web site