Final Examination

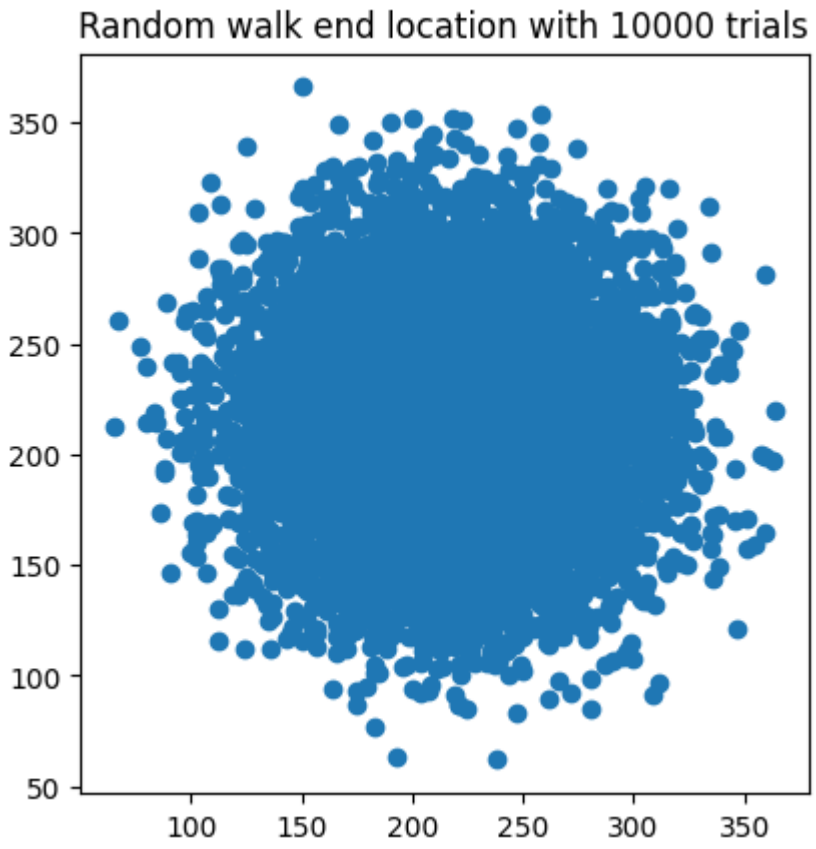
Question 1:

Probably 16

Question 2:

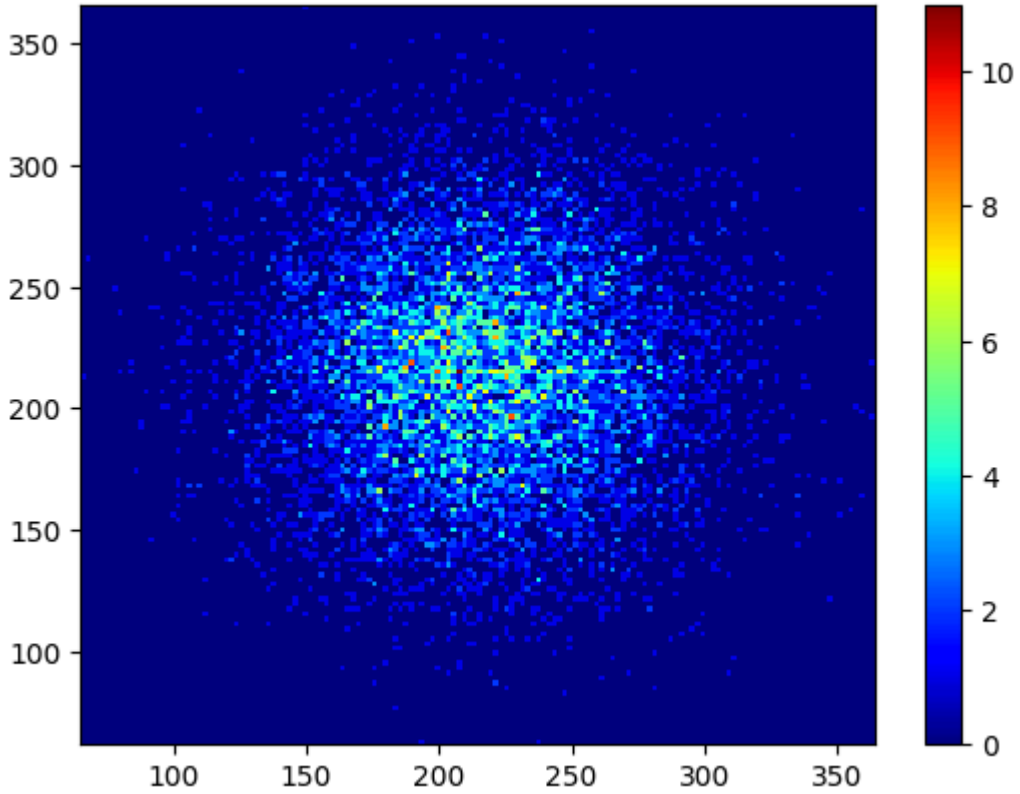
A. Somewhere northeast. 3600 seconds in an hour, each second the average distance traveled is 0.06 +x and 0.06 +y. $0.06 \times 3600 = 216$. Mean position should be 216 steps north by 216 steps east.

Based on an average step length of 2.5 feet, we can find the distance from the origin. 216 steps is 540 feet for the average person, or 0.1022 miles. Using the Pythagorean theorem we can find the absolute distance traveled of 0.1445 miles. This is very slow. Randomly walking in different directions appears to be a highly ineffective way of traveling, and research should be conducted into more efficient methods. Visualization of random walk ends is below:

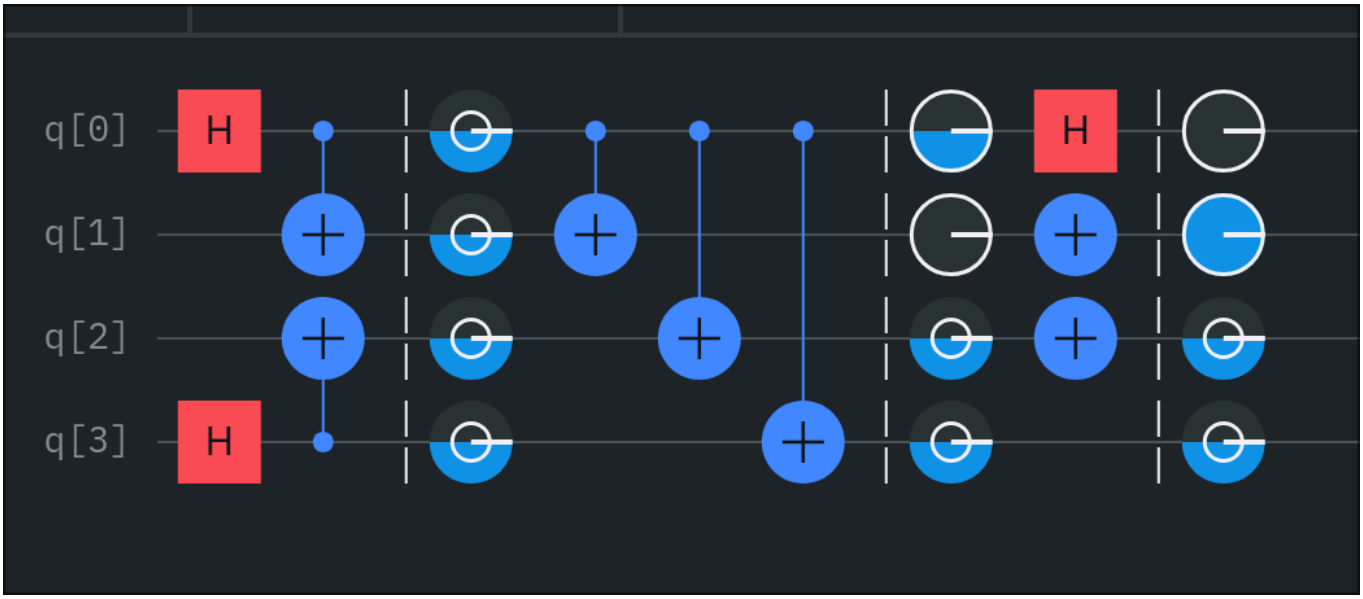


B: Depends on the walkers shoes. (also see python notebook)

C:



Question 3:



A:

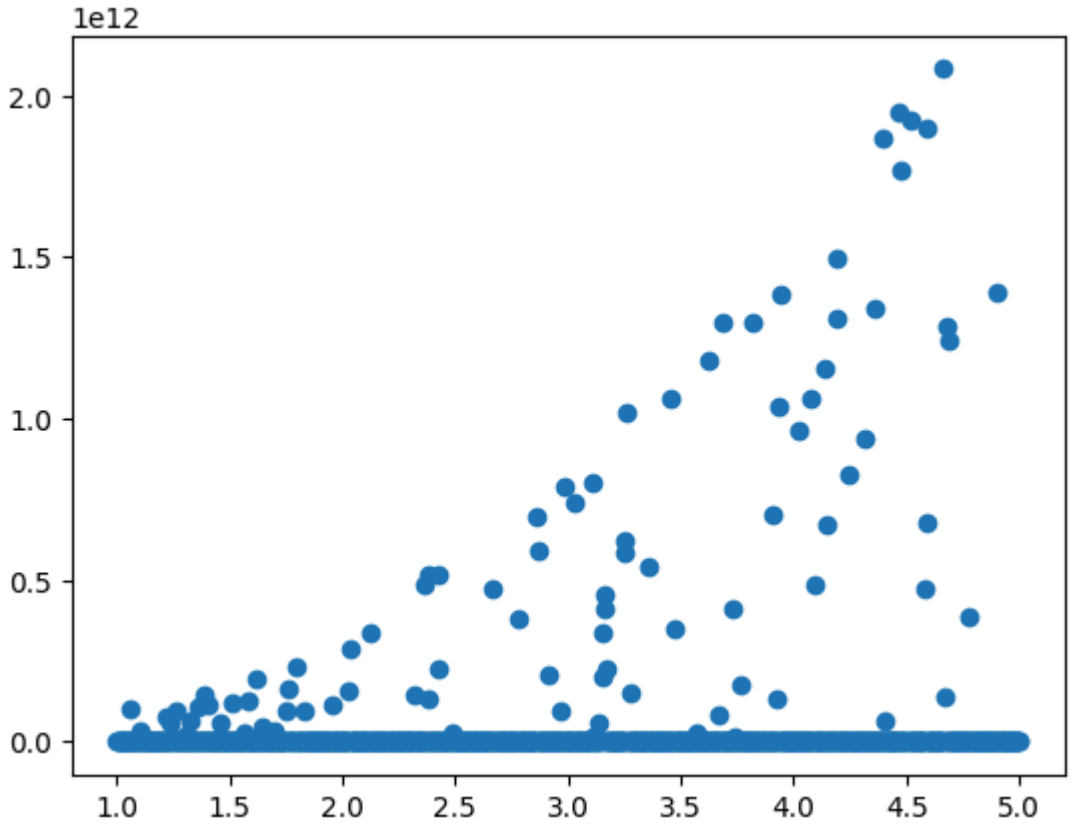
$|\psi_1\rangle$ is $\frac{1}{\sqrt{4}}|1011\rangle + \frac{1}{\sqrt{4}}|0011\rangle + \frac{1}{\sqrt{4}}|0000\rangle + \frac{1}{\sqrt{4}}|0011\rangle$

B:

$$|\psi_2\rangle = \frac{|0100\rangle + |0111\rangle}{\sqrt{2}}$$

Question 4:

See python ipynb



My laptop is running low, and I'm confident that this exam grade is going to be my drop regardless, so I'm gonna call it here. I want to thank you for a wonderful class and semester Dr. West. I hope you had a great time in Venice, and I hope to see you again.

Best
Paul Lea