Lab4 Shuhan Xu

4.2.2.1

The ATP will be completely depleted. This is because the pumped ions will diffuse back down the concentration gradient.

4.2.2.2

We can be sure that an ATP is consumed because the protein needs to consume ATP to push the ion to the higher energy state.

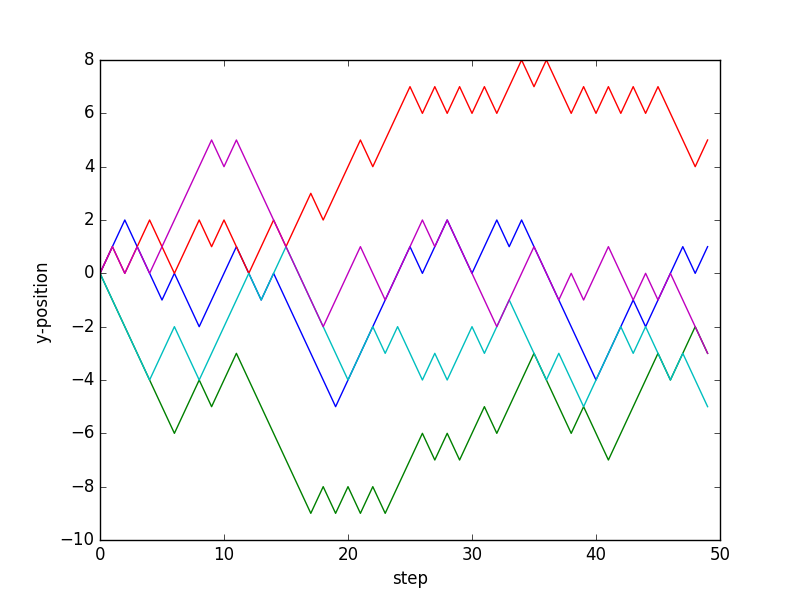
4.2.2.3

The ion will be distributed according to the Boltzamnn distribution with more ions being in the low-energy state as compared to the high-energy state.

4.3.1

change = np.sign(np.random.rand() - 0.5) \* stepLength

4.3.2



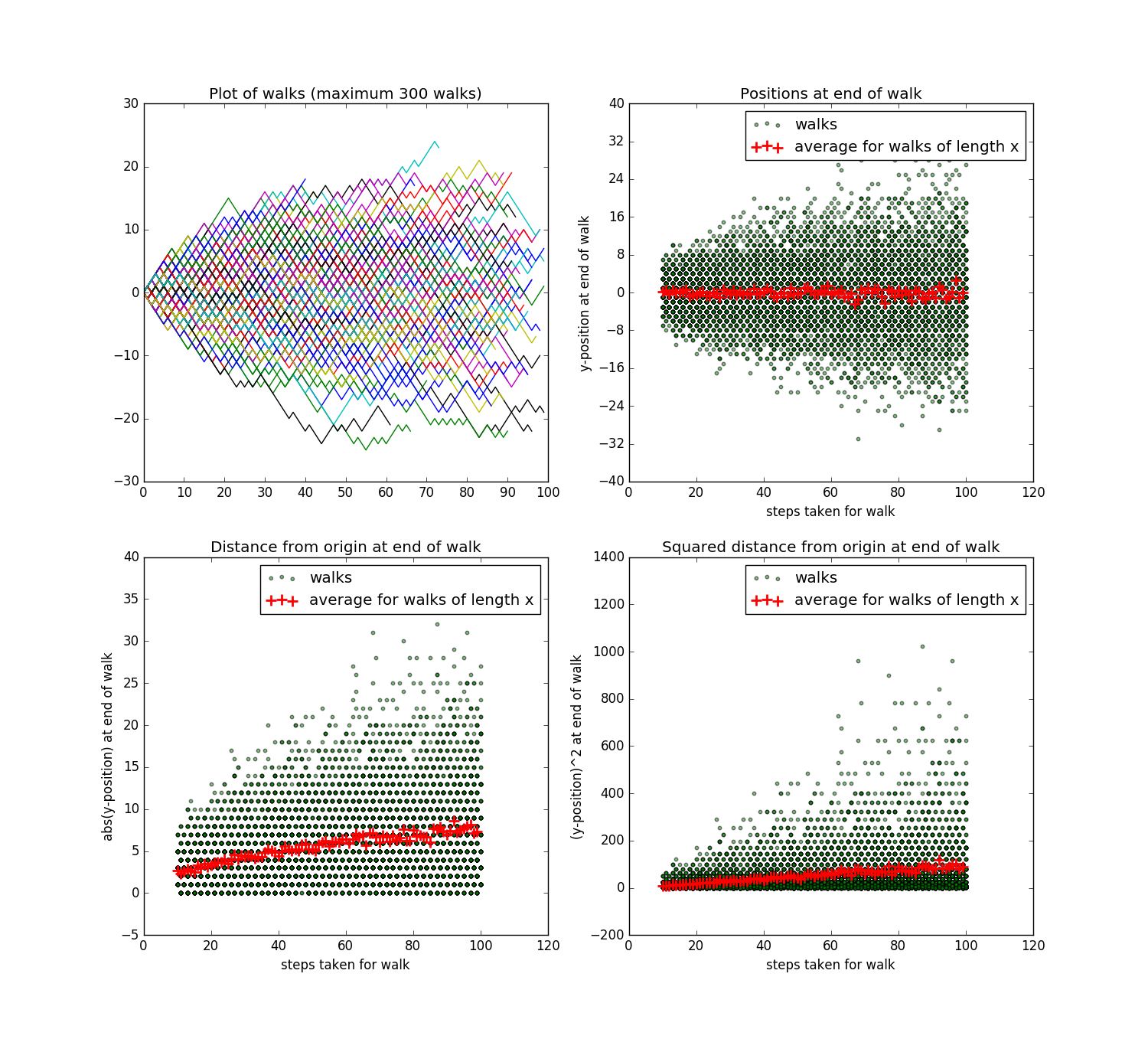
4.3.3

It is not a random walk. Whether the random move is accepted or rejected is based on the energies of current state and the next state.

4.4.1

The average y-position at the end of the walk is approximately 0 for all number of steps.

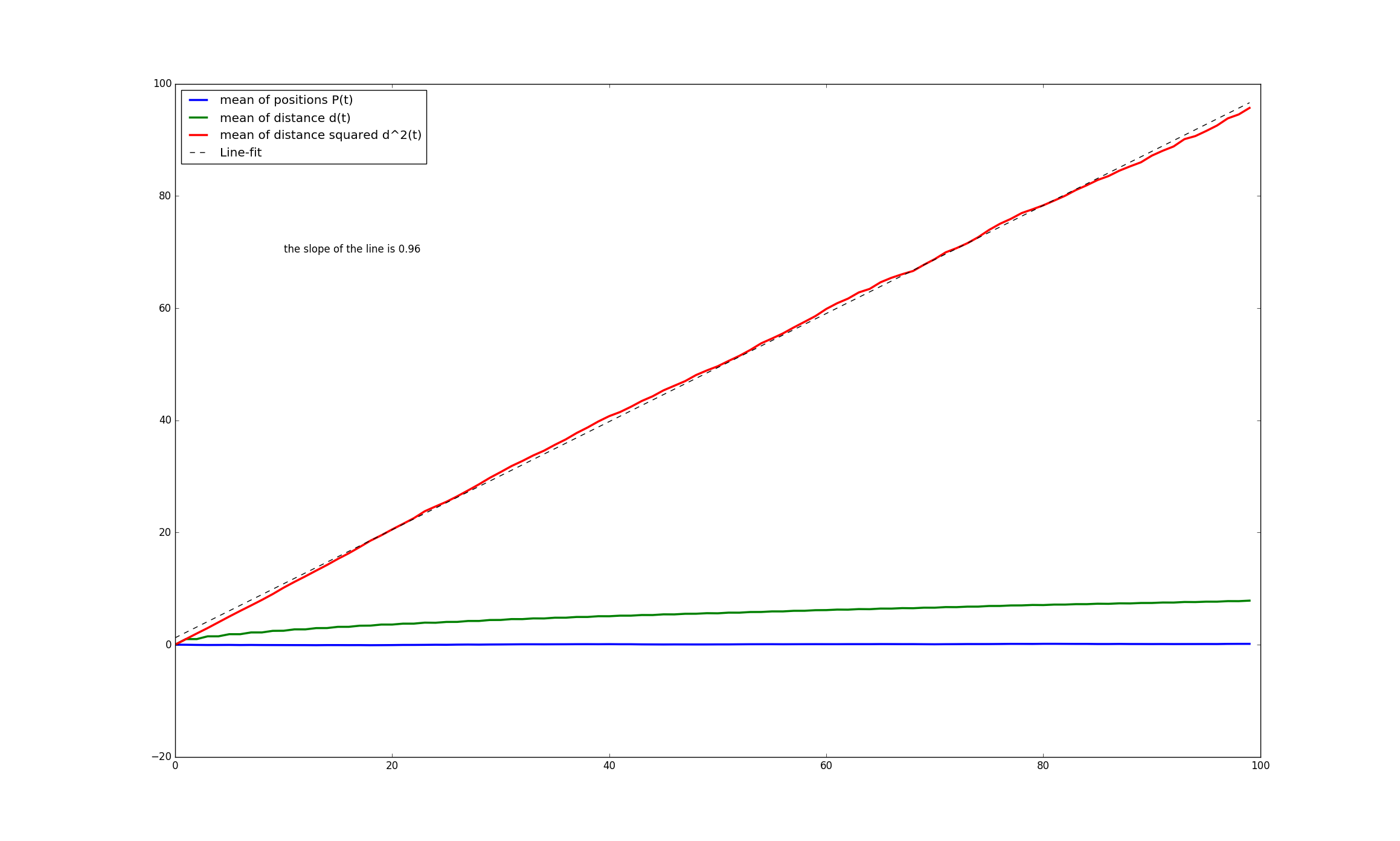
The absolute y-position at the end of the walk is proportional to the square root of number of steps

The squared y-position at the end of the walk is proportional to the number of steps

4.5.1

This is a linear form.

4.5.2



KN is approximately 1.

4.6.1

m2s-1

4.6.2

The water molecules move faster, i.e. diffuse further after a period of time.

4.6.3

Kt is 1 for all combinations of settings.

When step length is 2, Kt is 4.

Kt = L2

Xave2 = L2 \* t

7.