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Date: Monday September 9, 2019

Course: PHYS 1111

Lab: Lab 2 Parts 1-4

Grade:_____

1) **Objective:**

   a. The goal of this investigation is to get more familiar using Sage Math and get skilled at solving constant acceleration 1D motion questions.

2) **Theory**:

   a. Students are expected to be able to understand the problems and analytically solve them in each part using the equations learned in lecture.

   b. Variables:

      i. V_f = final velocity

      ii. V_i = initial velocity

      iii. X_f = final velocity

      iv. X_i = initial velocity

      iv. A = acceleration

      v. T= time

   c. Formulas:

      i. $\Delta V = a\Delta t$

      ii. $\Delta x = v\ i\ \Delta t + .5a\ (\Delta t)^2$

3) **Procedure**:

   a. Part 1

      i. First, use Sage Math to create a plot of the ball's height as a function of time. While using the equation

   b. Part 2

i. Hand sketch a graph of both the y1 axis and the y2 axis. To compare how the different perspective changes the outcome of the ball's height at different times.

c. Part 3

i. Match the three sets of parameters to their equivalent curve on the graph and justify your answers for each.

d. Part 4

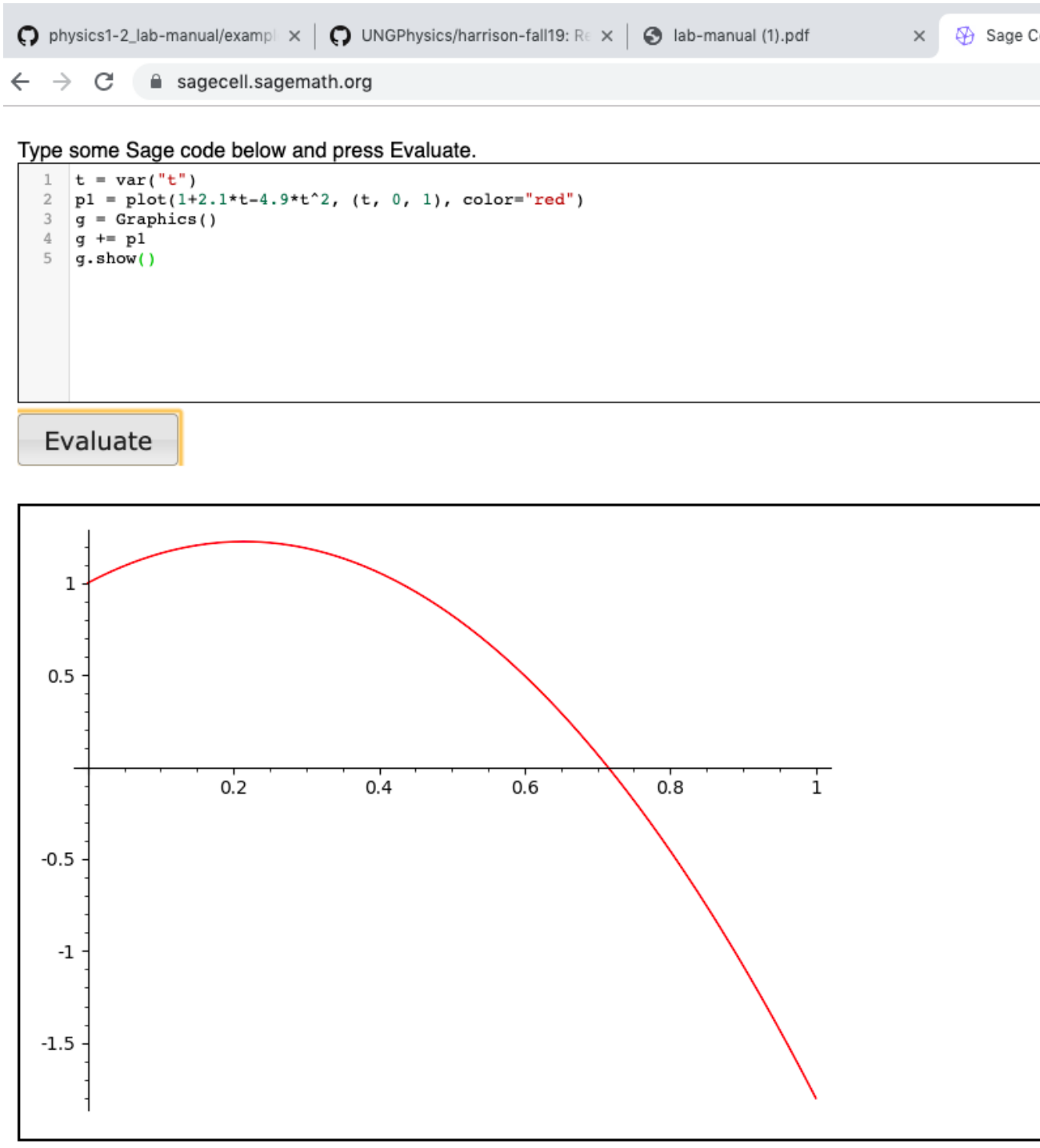
i. Download the zip file. Copy the data provided from the lab manual into the XYdata.txt and modify it to use a function under constant acceleration. Restart the application and tune the parameters to determine the initial position, initial velocity, and acceleration.

4) **Data**: (attached to the back of this report)

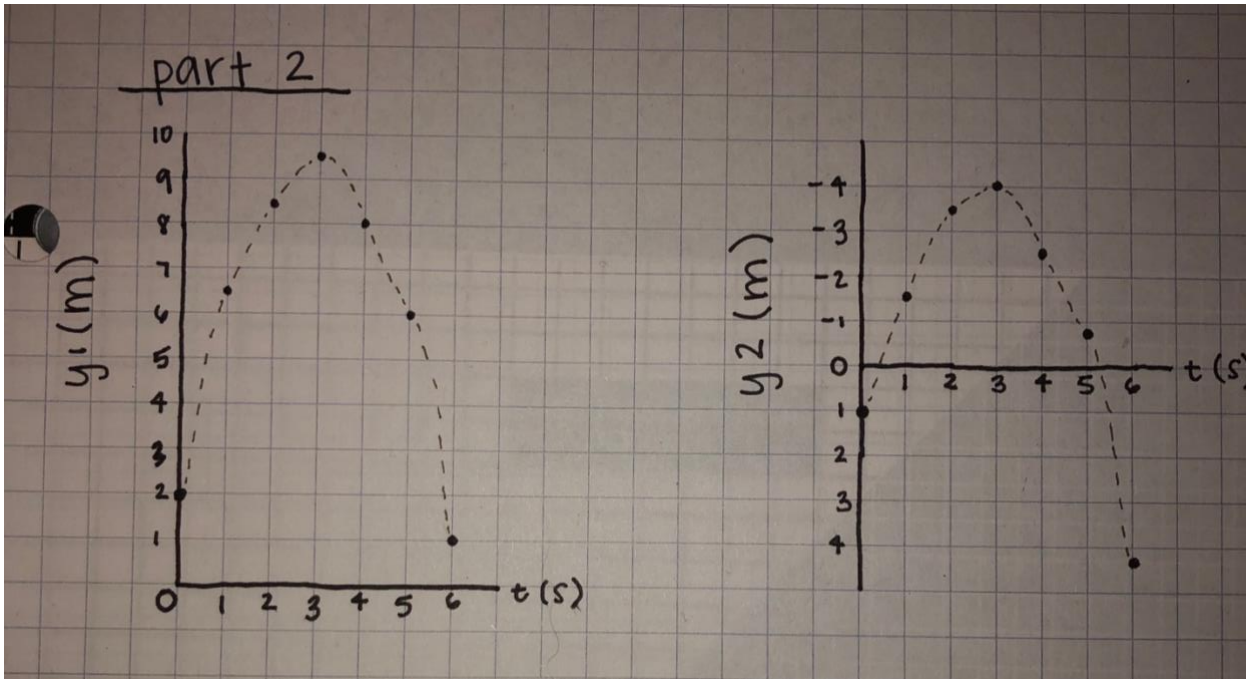
5) **Calculations**: (attached to the back of this report)

6) **Results**:

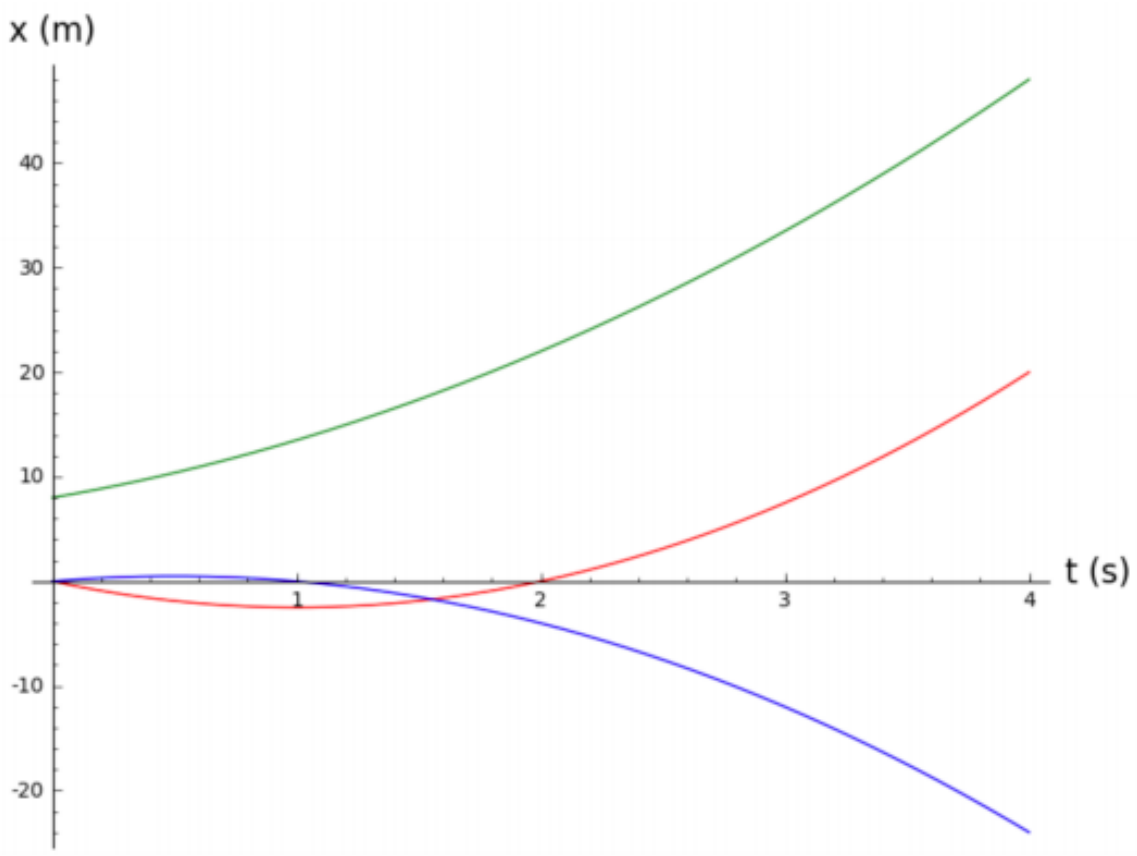
a. Part 1



b. Part 2

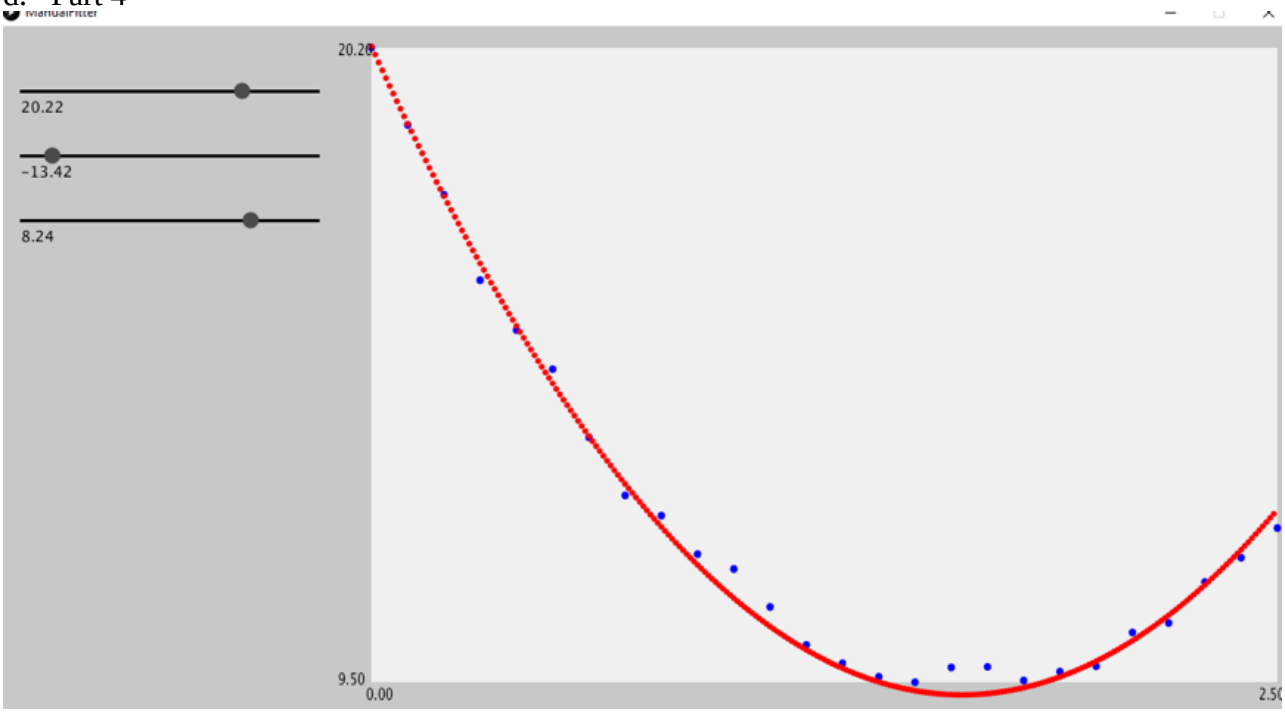


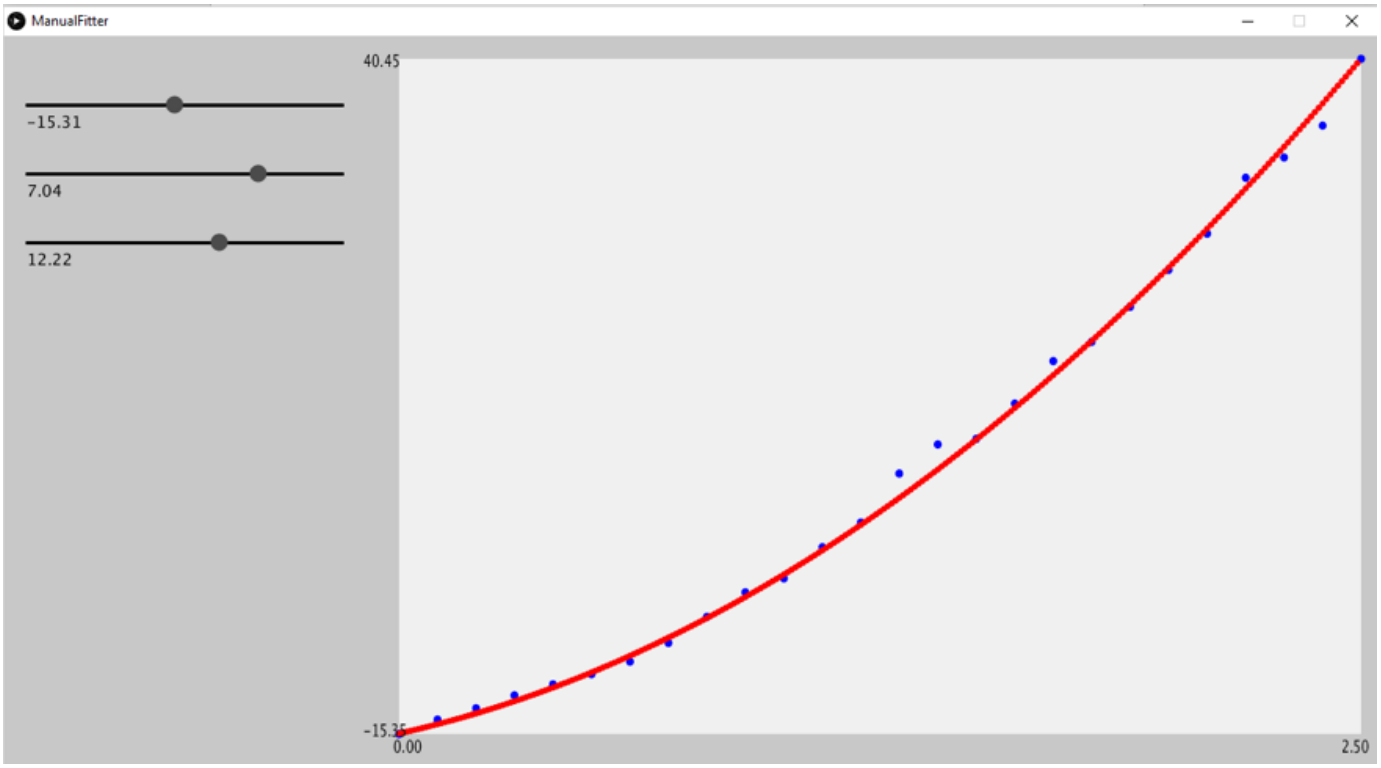
c. Part 3



- Xi = 0m, Vi = -5m/s, a = 5 m/s^2 goes with the red line on the graph above. This is because, it has a positive acceleration and the red line is going in a positive direction on the graph.
- Xi = 0m, Vi = 2 m/s, a = -4 m/s^2 goes with the blue line on the graph above. This is because, the blue line on the graph is going in a negative direction and it's acceleration is negative which would cause this negative direction.
- Xi = 8 m, Vi = 4 m/s, a = 3 m/s^2 goes with the green line on the graph above. I know that this goes with the green line because, the initial is 8m and it goes through 8m at 0t.

d. Part 4

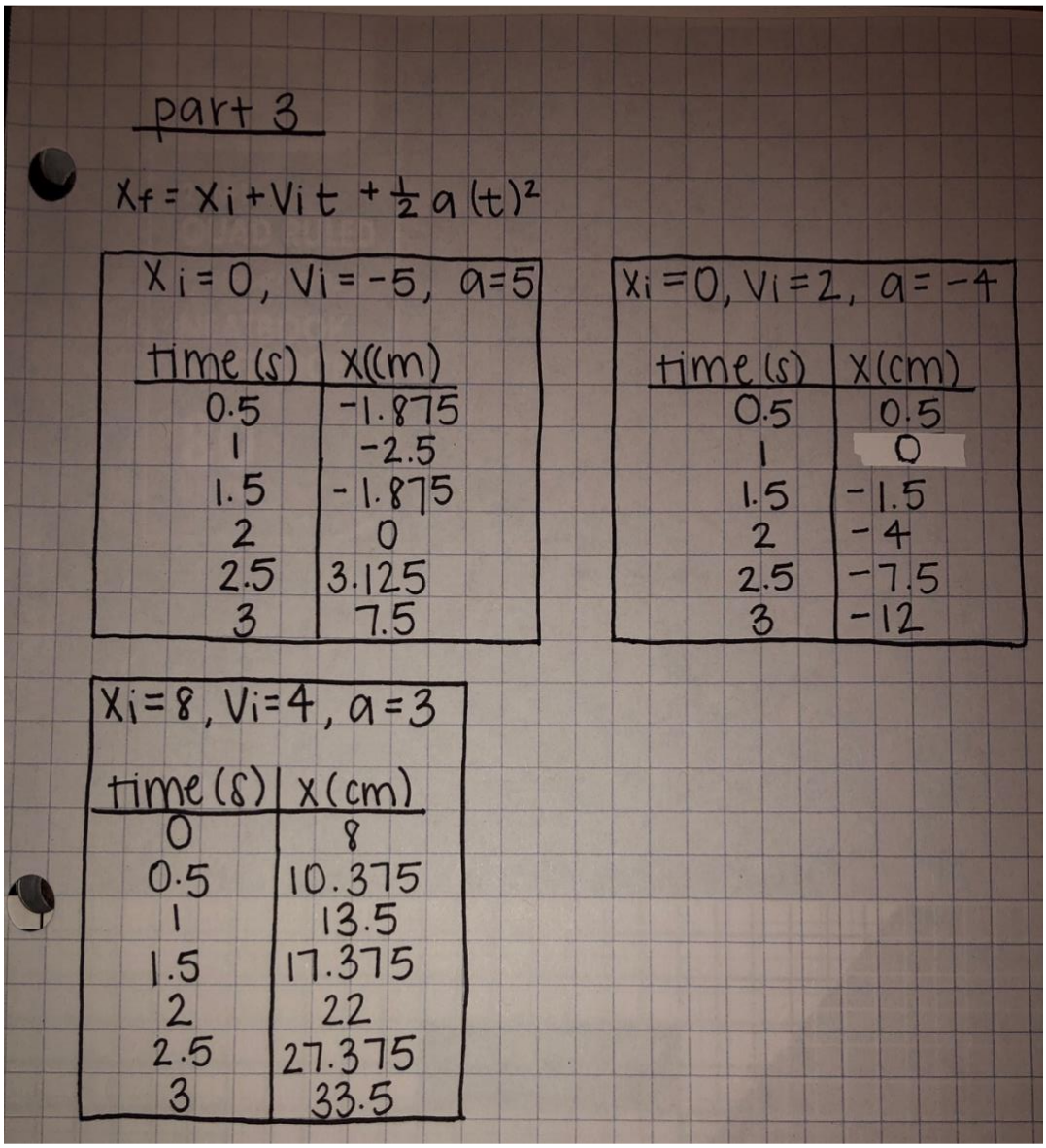




7) Comments:

   a. This lab, being the first one that we have done this semester, was complicated in the beginning to grasp how to use some of the applications like sage math and the zip folder in part 4.

Data/ Calculations



part 3

$X_f = X_i + V_i t + \frac{1}{2} a (t)^2$

$X_i = 0$, $V_i = -5$, $a = 5$

time (s)	X((m)
0.5	-1.875
1	-2.5
1.5	-1.875
2	0
2.5	3.125
3	7.5

$X_i = 0$, $V_i = 2$, $a = -4$

time (s)	X(cm)
0.5	0.5
1	0
1.5	-1.5
2	-4
2.5	-7.5
3	-12

$X_i = 8$, $V_i = 4$, $a = 3$

time (s)	X(cm)
0	8
0.5	10.375
1	13.5
1.5	17.375
2	22
2.5	27.375
3	33.5