LAST name␣[ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] Section_____

First name_____

A student has acquired data on the motion of a cart, and created the following mathematical model of the data:

$x(t) = 2t + 4$

I've omitted the units, but it's the usual SI units of meters, seconds, etc. Based on this model,

Where is the cart at $t = 0$?
How fast is going at $t = 0$?
Which way is it going at $t = 0$?
What is its acceleration at $t = 0$?

Can this model be used to tell where the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

Can this model be used to tell what the acceleration of the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

Can this model be used to tell what the velocity of the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

A student has acquired data on the motion of a cart, and created the following mathematical model of the data:

$x(t) = 3t^2 - 2t + 6$

I've omitted the units, but it's the usual SI units of meters, seconds, etc. Based on this model,

Where is the cart at $t = 0$?
How fast is going at $t = 0$?
Which way is it going at $t = 0$?
What is its acceleration at $t = 0$?

Can this model be used to tell where the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

Can this model be used to tell what the acceleration of the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

Can this model be used to tell what the velocity of the cart is at $t = 2$ s? If so, explain how would you do it. (I'm not asking you to do it, just to explain how you would do it.) If not, explain why not.

Give a possible mathematical model for a cart that, at $t = 0$, is located to the right of the origin, and is moving to the left and slowing down. (1 pt)

Because of your physics skills you have been selected to scout locations for the first movie to be shot on another planet. However while there an alien sneaks up behind you and hits you on the head. When you wake up you cannot remember what planet you are on, but you do have a table of gravitational acceleration on the different planets and a ball you can throw. Use the specified data file in Logger Pro for a ball that is thrown straight up and the position measured using a motion detector from lab. Use the modeling techniques you learned in lab to determine what planet or planets you could be on. Write down your model equation in the way that you learned in lab. Sketch your graph and label the axes. (8 pts)

Planet	Gravity
Jupiter	$24.9 \ m/s^2$
Neptune	$11.1 \ m/s^2$
Saturn	$10.4 \ m/s^2$
Earth	$9.8 \ m/s^2$
Uranus	$8.9 \ m/s^2$
Venus	$8.9 \ m/s^2$
Mars	$3.7 \ m/s^2$
Mercury	$3.7 \ m/s^2$
Moon	$1.6 \ m/s^2$
Pluto	$0.58 \ m/s^2$

Find the specified data file in LoggerPro of cart masses and acceleration. Use the modeling techniques you learned in lab to find a mathematical model describing the dependence of acceleration of the cart on the cart's mass. Write down your model equation and provide a physical interpretation of the parameter(s). Sketch your graph and label the axes. (4 pts)