NS540 Worksheets for session 2 (at-home session) due at session 3

NAME: _____

Constant-acceleration equations

$$x = x_i + v_i t + \frac{1}{2} a t^2 \qquad v = v_i + at \qquad v^2 = v_i^2 + 2a(x - x_i)$$

Now we'll get some practice using the equations. Be methodical. In each case begin by:

- Drawing a sketch of the situation.
- Choosing an origin and a positive direction and marking them on the sketch.
- Setting up a data table with everything you know.
- Only then figuring out which of the constant-acceleration equations to apply.

EXAMPLE 1: A cyclist has an initial velocity of 4.0 m/s directed south. The cyclist then accelerates at 2.0 m/s^2 south for 3.0 seconds.
(a) What is the cyclist's velocity at the end of the 3.0-second acceleration period? _____
(b) How far does the cyclist travel during the 3.0-second acceleration period? _____

EXAMPLE 2: You are driving your car at 20 m/s when you see a deer in the road 60 m ahead. It takes you 1.0 seconds before you apply the brakes, but then the car slows down and comes to a stop. Assuming the car's acceleration is constant, what magnitude acceleration (at least) is required to avoid hitting the deer? _____

Phet simulation exercise, using “The Moving Man”

You can either google “Phet simulations” to find this simulation, or use the link to the Phet simulation “The Moving Man” from the NS540 site,http://physics.bu.edu/~duffy/NS540.html

When you are on the simulation page for “The Moving Man” simulation, scroll down to the “Ideas and Activities for this Sim”

Near the top of the long list of activities, click on the activity by D. Montoux, titled (yes, there is a typo in the name) “Anayzing Motion Man Graphs”

That will take you to a new page, where you can click on the name of the Microsoft Word document “The Moving Man.doc.” Print out this 2-page worksheet and complete the worksheet, with the help of the simulation. You will hand in your completed worksheet at session 3.

Don’t forget to explore the Phet site for lots more great simulations.

Building assignment – make an accelerometer

For session 3, please bring in a simple accelerometer (a device that can give a qualitative measurement of acceleration) that you have made yourself. You should be able to find ideas for a design on the web, if you can’t come up with something yourself.