REMEMBER: All XL labs have "required elements" of content and style. Be sure to refer to the ***Formatting and Grading of XL Labs*** and the ***Reference and Style Guide for Microsoft XL*** (as found on the website) in order to acquaint yourself fully with these requirements. Set up your spreadsheet for each problem such that all stated values are included in the "parameter section" change these values conveniently ("flexible spreadsheet").

1. ROCKET SLED. A rocket sled on a horizontal straight track is moving at a speed of 95 m/s toward the origin. When it is +1200 m (t = 0) from the origin, the sled fires its retrorockets such that the sled instantaneously achieves (and subsequently maintains) an acceleration of +4.2 m/s^2. Determine the position and velocity of the sled as a function of time and find

   a. the position and time of closest approach of the sled to the origin.
   b. the velocity of the sled at 12.2 sec.
   c. the velocity of the sled when it is 800 m from the origin.

Suggestions: This is a problem that simply parallels the problem presented in class. Be sure to consider the v vs. s plot as a way of presenting the solution to the problem.

2. TWO BALL PROBLEM. A ball is thrown straight up at a speed of 50 m/s from the top of a 225 m cliff. Simultaneously, a second ball is thrown straight up from the base of the cliff at a speed of 85 m/s. Determine the position and velocity of each of the two spheres as a function of time and find

   a. where and when the two balls collide. Do the balls collide when they are moving up or down? Explain.
   b. the time when each of the two spheres reach the peaks of their flights.

Suggestions: Two objects require two sets of parameters. As always, be sure that your spreadsheet is "flexible," capable of finding solutions to problems with initial conditions other than those stated. Set up your parameters accordingly.

3. TWO DIMENSIONAL PROJECTILE. A cannonball is fired off of a 350 m cliff at a speed of 50 m/s at an angle of 36.87° above horizontal.

   a. Determine how far from the base of the cliff that the cannonball will land and the time it takes the ball to hit the ground.
   b. Determine the speed of the cannonball at 8.7 sec.

Suggestions: This problem, like so many others, should offer a flexible solution to the problem. Let Excel solve for the x- and y-components of the velocity for all possible initial velocities and angles. To that end, note that Excel treats the "arguments" in the sin(angle) and cos(angle) functions as radian values. The function radians(angle) will convert degrees to radians. In addition, would it not be possible to account for any horizontal acceleration as needed?

4. FREEFALL BY ENERGY METHODS. A ball is thrown straight down from the top of a 1000 m cliff with an initial speed of 4.3 m/s. Using energy methods, determine the speed of the ball as a function of its position relative to the top of the cliff. Graphically determine the speed of the ball when it is 350 m below the edge of the cliff.

Suggestions: This problem is NOT like the others. Consider the position as the independent variable and visualize the ball falling small, incremental distances, Δs, (as opposed to what you've done with the previous problems which is use same, incremental time steps). Can you find the requisite energy values at each position? And from that, can you find the speed at each point? What plot could you then produce?