Calibrating a Cannon – Prelab Quiz

Answer these questions after reading the "Projectile Motion: Calibrating a Cannon" assignment. Submit your answers via Blackboard as either a MS Word (.docx) or MS Excel spreadsheet file (.xlsx). Be sure to show all of your work so that partial credit can be given.

1. **[5 points]** A projectile is fired horizontally from some height, $y \pm \delta_y$, and hits the ground a horizontal distance, $x \pm \delta_x$, away. Use the position of impact to calculate the initial velocity, $\vec{v}_o$, of the projectile. In other words, find $\vec{v}_o$ as a function of x, y and the acceleration due to gravity g.

   Hint: Use the equations of motion in the vertical:

   $$y(t) = y_o + v_{oy}t - \frac{1}{2}gt^2$$

   and horizontal directions:

   $$x(t) = x_o + v_{ox}t.$$

   to solve for $\vec{v}_o$.

2. **[5 points]** Use error propagation to calculate the uncertainty associated with the initial velocity, δv_o in terms of x, y, δx, and δy.