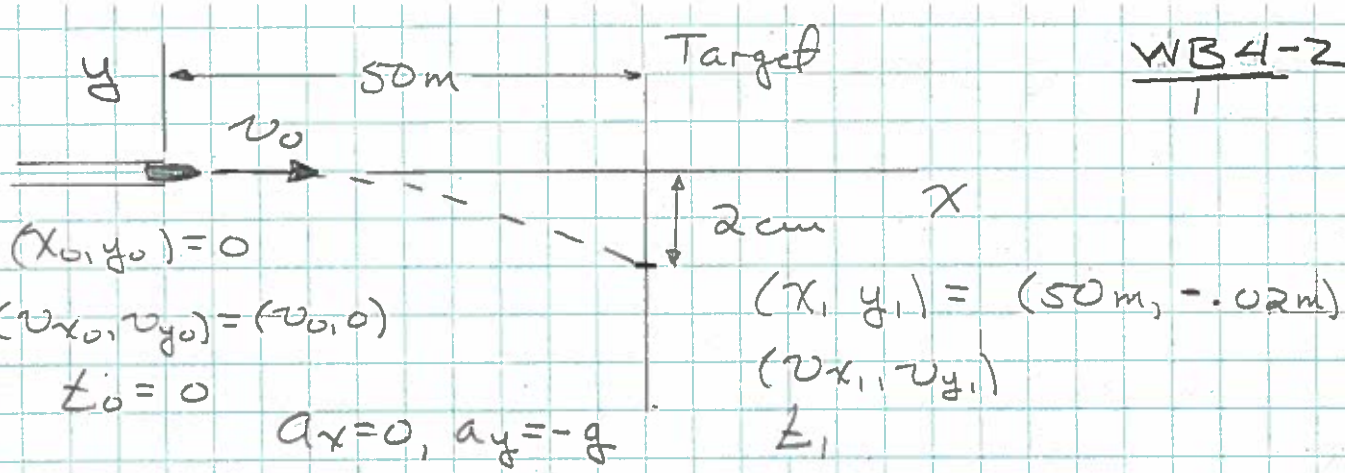

a.) find t_1:

y-motion: $y_1 = y_0 + v_{y0}\Delta t + \frac{1}{2} a_y \Delta t^2$

$\Delta t = t_1 - t_0$

$$y_1 = -\frac{1}{2} g t_1^2$$

$$t_1 = \sqrt{\frac{-2y_1}{g}} = \underline{0.06395}$$

b.) find v_0:

x-motion: $x_1 = x_0 + v_{x0}\Delta t + \frac{1}{2} a_x \Delta t^2$

$\Delta t = t_1 - t_0$

$$x_1 = v_0 t_1$$

$$\therefore v_0 = \frac{x_1}{t_1} = \underline{782.6\ m/s}$$