



Distraction and Reaction Time – Prelab Quiz

Answer these questions after reading the “Random Uncertainties” 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]** Assume that a ruler is initially suspended such that its lower end is at height, $h = 0$. The ruler is then dropped and allowed to accelerate (with constant acceleration $a = -g$), towards the earth. The ruler is caught by a student when it has dropped a distance, d (*i.e.* the bottom of the ruler is now at the position, $-d$).

What is the time t it takes for the ruler to fall a distance d ?

In other words, use

$$y(t) = y_i + v_i t + \frac{1}{2} a t^2, \quad (0.1)$$

and the given initial conditions, to find an expression for t in terms of the distance y .

2. **[5 points]** Using error propagation, find an expression for the uncertainty in the computed time, δ_t . Express your answer in terms of g and the uncertainty in the distance measurement, δ_d . Assume that g is known precisely (*i.e.* there is no associated error, δ_g).