Review of Kinematics

Velocity

$$v = \frac{\text{change in position}}{\text{change in time}} = \frac{dx}{dt}$$

displacement :

$$\Delta x = v\Delta t$$

Equation of Uniform Motion :

$$x(t) = x_0 + v_0 t$$

Acceleration

$$a = \frac{\text{change in velocity}}{\text{change in time}} = \frac{dv}{dt}$$

$$\Delta v = a\Delta t$$

displacement (if $v_0 = 0$) :

$$\Delta x = \frac{at^2}{2}$$

Equations of "$a = const$" Motion :

$$v(t) = v_0 + at$$

$$x(t) = x_0 + v_0 t + \frac{at^2}{2}$$

* Here x_0 and v_0 are position and velocity at t=0.

Homework 7

A stone is thrown from the ground with initial velocity v_0 directed at angle α with respect to the horizon. Find equations of its motion both in x and y directions. From your equations, determine the following:

a) The total time of flight (till the stone hits the ground).
b) The horizontal distance d that the stone will travel until it falls.

Hint: As we discussed in class, the two motions are independent, one of them is uniform, and the other is at constant acceleration.