

Extra Credit...

Due: Friday, October 20, 2006 before class starts...

You have to get it right for it to count!

A ball of mass m is thrown vertically upwards with an initial velocity v_i . Assume that the force due to air resistance is directly proportional to v^2 and the terminal velocity is v_t . Show that the ball returns to its position with velocity v_f given by:

$$\frac{1}{v_f^2} = \frac{1}{v_i^2} + \frac{1}{v_t^2}$$

Keep in mind these equations are dynamic....

On the way up: $+m \frac{d^2 y}{dt^2} = -bv^2 - mg$

On the way down: $-m \frac{d^2 y}{dt^2} = +bv^2 - mg$