Math 17A
Vogler

Gravity Problems

Defn Let $s(t)$ measure distance at time t

1) $s'(t)$ is <u>instantaneous</u> <u>velocity</u> at time t, usually denoted $v(t) = s'(t)$ with units $\frac{\text{distance}}{\text{time}}$

2) $s''(t)$ is <u>instataneous</u> <u>acceleration</u> at time t, usually denoted $a(t) = s''(t)$ with units $\frac{\text{distance}}{\text{time}^2}$

For free-falling and projectiles on earth, assuming accceleration is only due to gravity ($g = -32\ ft/sec^2$), we have the following formulas:

1) $a(t) = s''(t) = -32\ ft/sec^2$

2) $v(t) = s'(t) = -32t + v_0$ ← initial velocity (i.e. $v_0 = v(0)$)

3) $s(t) = -16t^2 + v_0 t + s_0$ ← initial position (i.e. $s_0 = s(0)$)

Ex A ball is projected upward at 96 ft/sec from the top of a 256 ft high building.

1) How high does the ball go?
2) How long is ball in the air?
3) What is ball's velocity when:
   a) $t = 1$ sec b) it strikes ground