Math 217 - September 20, 2010

- Acceleration and velocity with air resistance

1. Let ρ and g be positive constants. Solve $\frac{dv}{dt} = -\rho v - g, \quad v(0) = v_0$

2. Let ρ and g be positive constants. Solve $\frac{dv}{dt} = -g\left(1 + \frac{\rho}{g}v^2\right)$

Lecture Problems

3. You fire a rocket directly up into the air from the ground. Assume that air resistance is proportional to velocity. The initial velocity of the rocket is 20 m/sec. Take $\rho = .04$ and $g = 9.8$.

   (a) Find the differential equation that models the velocity of the rocket.

   (b) Find the velocity of the rocket

   (c) Find the height of the rocket.

   (d) How long does it take the rocket to get to the peak of its ascent and how high is that?

4. You fire a rocket directly up into the air from the ground. Assume that air resistance is proportional to velocity squared. The initial velocity of the rocket is 20 m/sec. Take $\rho = .001$ and $g = 9.8$.

   (a) Find the differential equation that models the velocity of the rocket.

   (b) Find the velocity of the rocket

   (c) How long does it take the rocket to get to the peak of its ascent and how high is that?