1. A construction worker stands at the top of a 40 meter bell tower and throws a clock face upward with a speed of 5 m/s. Suppose there is a force due to air resistance acting on the clock face in the opposite direction of velocity with a magnitude of $\frac{|v|}{22}$ m/s. Set up a differential equation to model this scenario (use g = 9.8 m/s^2 as the magnitude of the acceleration due to gravity).

2. Pete stands on the top of a 20 foot train and throws a 2 slug hammer upward with a speed of 10 ft/s. Suppose there is a force due to air resistance acting on the hammer in the opposite direction of velocity with a magnitude of $\frac{v^2}{2000}$ ft/s. Assuming the hammer misses the train, how long will it take the hammer to hit the ground? (Use g = 32 ft/s^2 as the magnitude of the acceleration due to gravity.)

3. Suppose that a rocket is launched straight up from the surface of the Earth with an initial velocity of $v_0 = \sqrt{2gR}$, where R is the radius of the Earth. Neglect air resistance. Find an expression for the velocity v in terms of the distance x from the surface of the Earth. Find the time required for the rocket to go 140,000,000 miles (the approximate distance from Earth to Mars). Assume that $R = 4000$ miles. (There are 5280 feet in a mile.)

4. Suppose that the rate of change of a function f is proportional to a function g. Write a differential equation which expresses this situation.

5. If Jack weighs 200 lbs, what is his mass?