1. If you drop a rock, it accelerates due to gravity. But as the rock falls faster, air resistance reduces the acceleration until the rock reaches terminal velocity. A differential equation for the velocity v (in meters per second) of the rock as it falls is

$$\frac{dv}{dt} = -9.8 + 0.002v^2.$$

Note that the $0.002v^2$ term represents air resistance. What is the terminal velocity of the rock? Hint: You don't need to solve the differential equation! Just figure how fast the rock needs to fall so that its velocity stops changing.

---

2. A simple electrical circuit has a 12-volt battery connected to a 6-ohm resistor and a 2-henry inductor. The current I (in amps) flowing through the circuit at time t (seconds) is determined by the differential equation

$$2\frac{dI}{dt} + 6I = 12.$$

(a) Sketch a slope field for this differential equation.

(b) What is the limiting value of the current I as time goes on?
