2. A sky-diver of mass, m, opens her parachute and finds that the air resistance, Fa, is given by the formula Fa= bv, where b is a constant and v is the velocity.
   a. Set up, but do not solve a differential equation for her velocity as a function of time.
   b. Set up, but do not solve a differential equation for distance as a function of time.
   c. Find the terminal velocity in terms of m, b, and g.
   d. If in a different situation the formula for air resistance were Fa= bv +cv², where c is another constant find the terminal velocity in terms of the above plus c.
   e. **If you are in Calc 2**, solve the differential equations from parts b and c.

a.

$$F_a = -bv \qquad F_{net} = ma$$

$$-bv - mg = m\frac{dv}{dt}$$

$$\frac{}{} = mg$$

b.

$$-b\frac{dx}{dt} - mg = \frac{md x^2}{dt^2}$$

c.

$$F_a = bv$$

$$v = \frac{F}{b}$$

$$v = \frac{mg}{b}$$

d.

$$F_a = bv + cv^2$$

$$cv^2 + bv - mg = 0$$

$$v = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$v = \frac{-b \pm \sqrt{b^2 - 4cm}}{2c}$$