$$\sum F = ma = \frac{dv}{dt}$$

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

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.

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

$$b = v = \frac{dx}{dt} - mg = m\frac{d}{dt}\left[\frac{dx}{dt}\right]$$

C = terminal velocity

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

$$bv - mg = 0$$

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

$$d = bv + cv^2 - mg = m\frac{dv}{dt}$$

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

$$bv + cv^2 = mg$$

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

$$v = \frac{-b \pm \sqrt{b^2 - (4)(c)(mg)}}{2c}$$