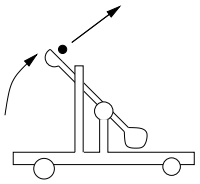
4. [10 points] Suppose we launch a 16 lb bowling ball from a catapult, as suggested in the figure to the right. In this problem we consider the vertical velocity v of the bowling ball. We shall assume that the initial vertical velocity is 45 ft/s, and that the bowling ball is released from a height of 50 ft. Gravity provides a downward acceleration of 32 ft/s^2, and the force of air resistance is proportional to the square of the velocity with constant of proportionality $k = 0.0005$. With these assumptions, the bowling ball reaches its apogee (highest point) of $h = 80.7$ ft at $t = 1.38$ seconds.



a. [6 points] Write an initial value problem for the vertical velocity of the bowling ball on its ascent. Note that you do not need to solve this problem.

b. [4 points] Write an initial value problem for the vertical velocity of the bowling ball on its descent. Note that you do not need to solve this problem.