Problem 24

A rocket sled having an initial speed of 150 mi/h is slowed by a channel of water. Assume that during the braking process, the acceleration a is given by $a(v) = -\mu v^2$, where v is the velocity and μ is a constant.

(a) As in Example 4 in the text, use the relation $dv/dt = v(dv/dx)$ to write the equation of motion in terms of v and x.

(b) If it requires a distance of 2000 ft to slow the sled to 15 mi/h, determine the value of μ.

(c) Find the time τ required to slow the sled to 15 mi/h.