Name

Date

Problem: 005

Given:

The acceleration of an object is given as a function of its position in feet by $a = 2\ s^2(\text{ft/s}^2)$. When $s = 0$, its velocity is $v = 1$ ft/s. What is the velocity of the object when $s = 2$ ft?

Required:

Solution:

Solution: We are given

$$a = \frac{v dv}{ds} = \left(\frac{2}{\text{ft-s}^2}\right) s^2,$$

$$\int_{1\ \text{ft/s}}^{v} v dv = \left(\frac{2}{\text{ft-s}^2}\right) \int_0^{2\text{ft}} s^2 ds$$

$$\frac{v^2}{2} - \frac{(1\ \text{ft/s})^2}{2} = \left(\frac{2}{\text{ft-s}^2}\right) \frac{(2\ \text{ft})^3}{3}$$

$$\boxed{v = 3.42\ \text{ft/s}.}$$