

$$2/27 \quad a = 400 - kx, \text{ where } k = \frac{400}{6/12} \text{ sec}^{-2}$$

$$a = 400(1 - 2x) \quad (x \text{ in ft})$$

$$v dv = a dx : \int_0^v v dv = 400 \int_0^x (1 - 2x) dx$$

$$v^2 = 800(x - x^2), \quad v = \frac{dx}{dt} = 20\sqrt{2} \sqrt{x - x^2} \quad (\text{taking + sign})$$

$$\int_0^t dt = \int_0^x \frac{dx}{20\sqrt{2} \sqrt{x - x^2}}$$

$$t = -\frac{1}{20\sqrt{2}} \sin^{-1} \frac{1-2x}{\sqrt{1}} \Big|_0^x = \frac{1}{20\sqrt{2}} \left[\frac{\pi}{2} - \sin^{-1}(1-2x) \right]$$

$$(a) \quad x = \frac{1}{4} \text{ ft} : t = \frac{1}{20\sqrt{2}} \left[\frac{\pi}{2} - \frac{\pi}{6} \right] = \underline{0.0370 \text{ sec}}$$

$$(b) \quad x = \frac{1}{2} \text{ ft} : t = \frac{1}{20\sqrt{2}} \left[\frac{\pi}{2} - 0 \right] = \underline{0.0555 \text{ sec}}$$