PROB. 11.15

$a = -\frac{K}{x}$, $v_0 = 15 \frac{ft}{s}$ WHEN $x_0 = 0.6$ ft; $v = 9 \frac{ft}{s}$ WHEN $x = 1.2$ ft

FIND v WHEN $x = 1.5$ ft, FIND x WHEN $v = 0$

$a = f(x)$

$$\frac{1}{2}v^2 - \frac{1}{2}v_0^2 = \int_{x_0}^{x} f(x)\,dx$$

$$= \int_{x_0}^{x} \left(-\frac{K}{x}\right) dx$$

$$\frac{1}{2}v^2 - \frac{1}{2}v_0^2 = -K \ln\left(\frac{x}{x_0}\right)$$

$$K = \frac{\frac{1}{2}(v_0^2 - v^2)}{\ln\left(\frac{x}{x_0}\right)} = \frac{\frac{1}{2}\left[(15)^2 - (9)^2\right] \frac{ft^2}{s^2}}{\ln\left(\frac{1.2}{0.6}\right)} = 103.9 \frac{ft^2}{s^2}$$

$$v = \sqrt{v_0^2 - 2K \ln\left(\frac{x}{x_0}\right)} = \sqrt{(15)^2 - 2(103.9) \ln\left(\frac{1.5}{0.6}\right)}$$

$$\boxed{v = 5.88 \frac{ft}{s}}$$

$$x = x_0 \exp\left[\frac{1}{2K}(v_0^2 - v^2)\right]$$

$$x = (0.6) \exp\left\{\frac{1}{2(103.9)} \cdot \left[(15)^2 - (0)^2\right]\right\}$$

$$\boxed{x = 1.77 \text{ ft}}$$