

Calculus 7.1 Story Problems

$$(57) a) f(t) = \frac{1.498t^2}{2} + 1.626t + C$$

$$8.893 = .749(4) + 1.626(2) + C$$

$$8.893 = 6.248 + C$$

$$2.645 = C$$

$$f(t) = .749t^2 + 1.626t + 2.645$$

b)

$$f(6) = 220.405$$

$$(58) P(x) = \int (x^{1/2} + \frac{1}{2}) dx = \frac{2}{3}x^{3/2} + \frac{1}{2}x + C$$

$$-1 = \frac{2}{3}(0^{3/2}) + \frac{1}{2}(0) + C$$

$$-1 = C$$

$$P(x) = \frac{2}{3}x^{3/2} + \frac{1}{2}x - 1$$

$$(65) v(t) = \int a(t) dt$$

$$v(t) = \int (5t^2 + 4) dt = \frac{5t^3}{3} + 4t + C$$

$$v(0) = \frac{5}{3}(0^3) + 4(0) + C = 6 \Rightarrow C = 6$$

$$v(t) = \frac{5}{3}t^3 + 4t + 6$$

$$(66) s(t) = \int v(t) dt$$

$$s(t) = \int (9t^2 - 3t^{1/2}) dt = \frac{9t^3}{3} - \frac{3t^{3/2}}{3/2} + C = 3t^3 - 2t^{3/2} + C$$

$$8 = 3(1^3) - 2(1^{3/2}) + C$$

$$8 = 3 - 2 + C \Rightarrow C = 7$$

$$s(t) = 3t^3 - 2t^{3/2} + 7$$

$$(67) v(t) = \int a(t) dt$$

$$v(t) = \int -32 dt = -32t + C$$

$$0 = -32(6) + C \Rightarrow C = 0$$

$$v(t) = -32t$$

$$s(t) = \int -32t dt = \frac{-32t^2}{2} + C = -16t^2 + C$$

$$6400 = -16(0)^2 + C \Rightarrow C = 6400$$

$$s(t) = -16t^2 + 6400$$

$$0 = -16t^2 + 6400$$

$$16t^2 = 6400$$

$$t^2 = 400$$

$$t = 20 \text{ sec}$$

$$(72) a) v(t) = \int -32 dt = -32t + C$$

$$v(0) = -32(0) + C = v_0$$

$$C = v_0 \Rightarrow v(t) = -32t + v_0$$

$$s(t) = \int (-32t + v_0) dt$$

$$s(t) = \frac{-32t^2}{2} + v_0 t + C = -16t^2 + v_0 t + C$$

$$s(0) = -16(0^2) + v_0(0) + C = 0 \Rightarrow C = 0$$

$$s(t) = -16t^2 + v_0 t$$

$$b) s(14) = -16(14^2) + v_0(14) = 0$$

$$-3136 + 14v_0 = 0$$

$$14v_0 = 3136$$

$$\Rightarrow v_0 = 224 \frac{\text{ft}}{\text{sec}}$$

$$c) 14 \cdot 224 = 3136 \text{ ft}$$

$$73) \quad B(t) = \int B'(t) dt = \int 9.2935 e^{.02955t} dt$$

$$= \frac{9.2935 e^{.02955t}}{.02955} + C = 314.5 e^{.02955t} + C$$

$$B(0) \approx 792.3 \rightarrow 314.5 e^{.02955(0)} + C = 792.3$$

$$314.5 + C = 792.3$$

$$C = 477.8$$

$$B(t) = 314.5 e^{.02955t} + 477.8$$

$$b) B(42) \approx 1565.785 \Rightarrow 1,565,785$$