$$\frac{dy}{dx} = x^2 + 4 \qquad (2,4)$$

$$\int dy = \int (x^2 + 4)\,dx$$

$$y = \frac{x^3}{3} + 4x + C$$

$$4 = \frac{2^3}{3} + 4 \cdot 2 + C$$

$$4 = \frac{8}{3} + 8 + C$$

$$4 = 10.66 + C$$

$$C = -6.67$$

$$C = -\frac{20}{3}$$

$$y = \frac{1}{3}x^3 + 4x - \frac{20}{3}$$

$f''(x) = 5$

$f'(3) = 4$

$f(3) = -3$

$f'(x) = 5x + c$

$4 = 5 \cdot 3 + c$

$4 = 15 + c$

$c = -11$

$f'(x) = 5x - 11$

$f(x) = \frac{5}{2}x^2 - 11x + c$

$-3 = \frac{5}{2}(3)^2 - 33 + c$

$30 = 22.5 + c$

$c = 7.5$

$f(x) = \frac{5}{2}x^2 - 11x + 7.5$

$$V = \frac{dx}{dt}$$

$$a = \frac{dv}{dt} = \frac{d^2x}{dt^2}$$

$$\int a = \int -9.8\, dt$$

$$\int v = \int -9.8t + c_1\, dt$$

$$x = \frac{-9.8t^2}{2} + c_1 t + c_2$$

$$x = \frac{1}{2}(-9.8)t^2 + c_1 t + c_2$$

$$\Delta x = V_0 t + \frac{1}{2}at^2$$

$$x_f - x_i = V_0 t + \frac{1}{2}at^2$$

$$x = \frac{1}{2}at^2 + V_0 t + x_0$$

$v_0 = 64$ ft/s $\quad v(0) = 64$

$x_0 = 80$ ft

$\int a = \int -32\,dt$

$V = -32t + c$

$64 = -32 \cdot 0 + c$

$c = 64$

$\int V = \int -32t + 64\,dt$

$x = -\frac{32}{2}t^2 + 64t + c$

$x = -16t^2 + 64t + c$

$x = -16t^2 + 64t + 80$

when does the ball hit the ground?

when $x = 0$

$0 = -16t^2 + 64t + 80$

$0 = -16(t^2 - 4t - 5)$

$0 = -16(t-5)(t+1)$

$t = 5 \quad t = -1$

$t = 5$