hw solutions
section 6.1

4. verify F is the antider. of f

$F(x) = x\ln x - x$ ; $f(x) = \ln x$

$F'(x) = (\ln x + 1) - 1 = \ln x = f(x)$

10. $\int \sqrt{2}\, dx = \sqrt{2}x + C$

30. $\int (2 + x + 2x^2 + e^x)dx$

$= 2x + \frac{1}{2}x^2 + \frac{2}{3}x^3 + e^x + C$

36. $\int (\sqrt[3]{x^2} - \frac{1}{x^2})\, dx$

$= \int (x^{2/3} - x^{-2})\, dx$

$= \frac{3}{5}x^{5/3} + x^{-1} + C$ or $= \frac{3}{5}\sqrt[3]{x^5} + \frac{1}{x} + C$

37. $\int \frac{u^3 + 2u^2 - u}{3u}\, du$

$= \int (\frac{1}{3}u^2 + \frac{2}{3}u - \frac{1}{3})\, du$

$= \frac{1}{9}u^3 + \frac{1}{3}u^2 - \frac{1}{3}u + C$

39. $\int (2t+1)(t-2)\, dt$

$= \int (2t^2 - 3t - 2)\, dt$

$= \frac{2}{3}t^3 - \frac{3}{2}t^2 - 2t + C$

43. $\int \frac{ds}{(s+1)^{-2}}$

$= \int (s^2 + 2s + 1)\, ds$

$= \frac{1}{3}s^3 + s^2 + s + C$

54. $f'(x) = \frac{1}{\sqrt{x}}$ ; $f(4) = 2$ ; find $f(x)$.

$f'(x) = x^{-1/2} \longrightarrow f(x) = 2x^{1/2} + C = 2\sqrt{x} + C$

$f(4) = 2\sqrt{4} + C = 4 + C$

$2 = 4 + C \Rightarrow C = -2$

$f(x) = 2\sqrt{x} - 2$

58. $f'(x) = 1 + e^x + \frac{1}{x}$, $f(1) = 3 + e$

find $f(x)$.

$f(x) = x + e^x + \ln x + C$

$f(1) = 1 + e + 0 + C$

$3 + e = 1 + e + C$

$2 = C$

$f(x) = x + e^x + \ln x + 2$

80. $h(0) = 400$ , $v(t) = -32t$

(a) find $h(t)$.

$v(t) = h'(t) = -32t$

$h(t) = -16t^2 + C$ , $h(0) = 400$

$h(t) = -16t^2 + 400$

(b) find $t$, where $h(t) = 0$.

$0 = -16t^2 + 400$

$16t^2 = 400$

$t^2 = 25$

$t = \pm 5$

ballast will hit the ground after 5 sec

(c) find $v(5)$.

$v(5) = -32(5) = -160$ ft/sec