6.1

60) $\frac{dy}{dx} = 2x$

$\int dy = \int 2x\,dx$

$y = x^2 + C$

$f^{-1}(x) = \sqrt{x}$

$\frac{dy}{dx} = 2y$

$\frac{1}{y}\,dy = 2\,dx$

$\ln|y| = 2x + C$

$y = e^{2x+C}$

17) $\frac{dy}{dt} = \frac{1}{1+t^2} + 2^t \ln 2$; $y = 3$ WHEN $t = 0$

$\int dy = \int \left(\frac{1}{1+t^2} + 2^t \ln 2\right) dt$

$y = \tan^{-1} t + 2^t + C$

$3 = \tan^{-1} 0 + 2^0 + C$

$3 = 0 + 1 + C$

$2 = C$

$\boxed{y = \tan^{-1} t + 2^t + 2}$

6.1

67) $\int \frac{d^2y}{dx^2} = \int 12x + 4$

$\int \frac{dy}{dx} = \int (6x^2 + 4x + C_1)$

$y = 2x^3 + 2x^2 + C_1 x + C_2$

b) $\int \frac{d^2y}{dx^2} = \int e^x + \sin x$

$\int \frac{dy}{dx} = \int (e^x - \cos x + C_1)$

$y = e^x - \sin x + C_1 x + C_2$

c) $\int \frac{d^2y}{dx^2} = \int x^3 + x^{-3}$

$\int \frac{dy}{dx} = \int (\frac{1}{4}x^4 - \frac{1}{2}x^{-2} + C_1)$

$y = \frac{1}{20}x^5 + \frac{1}{2}x^{-1} + C_1 x + C_2$

$\frac{d}{dx} 3^x$

$3^x \ln 3$

75) $\frac{dy}{dx} = 5^x \ln 5 + \frac{1}{x^2+1}$

$\int dy = \int (5^x \ln 5 + \frac{1}{x^2+1})\, dx$

$y = 5^x + \tan^{-1} x + C$

77) $\frac{dy}{dt} = 3t^2 \cos(t^3)$

$\int dy = \int (3t^2 \cos(t^3))\, dt$ (du)

$u = t^3$

$du = 3t^2\, dt$

$y = \int \cos u\, du$

$y = \sin u + C$

$y = \sin t^3 + C$

6.1

15) $\frac{dy}{dx} = -\frac{1}{x^2} - \frac{3}{x^4} + 12$ $\quad y=3,\ x=1$

$\int dy = \int \left(-\frac{1}{x^2} - \frac{3}{x^4} + 12\right) dx$

$\int dy = \int \left(-x^{-2} - 3x^{-4} + 12\right) dx$

$y = x^{-1} + x^{-3} + 12x + C$

$3 = 1^{-1} + 1^{-3} + 12(1) + C$

$3 = 14 + C$

$-11 = C$

$\boxed{y = x^{-1} + x^{-3} + 12x - 11}$

17) $\frac{dy}{dt} = \frac{1}{1+t^2} + 2^t \ln 2$ $\quad y=3,\ t=0$

$\int dy = \int \left(\frac{1}{1+t^2} + 2^t \ln 2\right) dt$

$y = \arctan t + 2^t + C$

$3 = \arctan 0 + 2^0 + C$

$3 = 1 + C$

$\boxed{y = \arctan t + 2^t + 2}$

21) $\int \sin(x^2)\, dx$

$\int_1^x \sin(t^2)\, dt + 5$

23) $\int_2^x e^{\cos t}\, dt + 9$