

1.  $y(x) = \frac{3}{4 - e^{3x}}$
2.  $y(x) = \frac{1}{3}(x - 1) + \frac{2}{3}(x - 1)^{-2}$
3. (a)  $2x^2y^{1/2} + \frac{1}{3}x^3 - 4x^{1/2}y^{1/2} + y^2 = C$   
(b)  $y(x) = \pm x\sqrt{Cx^4 - (1/2)}$
4.  $y(x) = c_1 \cos 2x + c_2 \sin 2x + c_3 e^{\sqrt{2}x} + c_4 e^{-\sqrt{2}x} - \frac{1}{8}x^2 - \frac{1}{16}$
5.  $y(x) = c_1 \cos 2x + c_2 \sin 2x + \left(\frac{1}{4} \ln |\cos 2x|\right) \cos 2x + \frac{1}{2}x \sin 2x$
6.  $x(t) = \frac{1}{8}e^t - \frac{1}{8}(\cos 2t - 3 \sin 2t)e^{-t}$
7.  $y(3) \approx y_2 = 7$
8.  $x(t) = c_1 e^{-3t} + c_2 e^{2t}$ ,  $y(t) = 3c_1 e^{-3t} + \frac{1}{2}c_2 e^{2t}$
9. (a)  $x(t) = c_1 e^{-2t} \cos t + c_2 e^{-2t} \sin t - \frac{3}{10} \cos 3t - \frac{1}{10} \sin 3t$   
(b)  $C = \sqrt{10}/10$
10. (a) IVP:  $\frac{dv}{dt} = 20 - 3v$ ,  $v(0) = 0$ . Solution:  $v(t) = \frac{20}{3}(1 - e^{-3t})$   
(b)  $\frac{20}{9}(29 + e^{-30})$  meters.
11.  $x(t) = 6(50 - t) - \frac{1}{25}(50 - t)^2$