Sample 1 – Exam 2 Answers

1. $y(x) = c_1 \sin x + c_2 \cos x + x \sin x - \cos x \ln|\sec x|$

2. (a)

$$\frac{dx}{dt} = -5x + y + 4, \quad x(0) = 1$$
$$\frac{dy}{dt} = 3x - 3y, \quad y(0) = 0$$

   (b)

$$x(t) = 1 - \frac{1}{4}e^{-2t} + \frac{1}{4}e^{-6t}$$
$$y(t) = 1 - \frac{3}{4}e^{-2t} - \frac{1}{4}e^{-6t}$$

3. $y(t) = 2\left[1 - e^{-3(t-2)}\right]u(t-2) - 2\left[1 - e^{-3(t-4)}\right]u(t-4)$

4. $f(t) = \dfrac{1}{10} - \dfrac{1}{10}e^{-t}\cos 3t + \dfrac{3}{10}e^{-t}\sin 3t$