Soluciones al examen final

1a)

$$\lambda_1 = -1 \qquad \lambda_2 = -2$$
$$t_1\begin{bmatrix}1\\4\end{bmatrix} \qquad t_2\begin{bmatrix}1\\3\end{bmatrix}$$

1b)

$$\lambda_1 = \lambda_2 = \lambda_3 = 2$$

$$s\begin{bmatrix}1\\0\\0\end{bmatrix} + t\begin{bmatrix}0\\0\\1\end{bmatrix}$$

2a)

$$y = \left[1-\cos(t-\pi)\right]\cdot u(t-\pi) - \left[1-\cos(t-2\pi)\right]u(t-2\pi) + \sin t$$

2b)

$$y = \frac{1}{3} - \frac{1}{2}e^{-t} + \frac{1}{6}e^{-3t} - \left[\frac{1}{3} - \frac{1}{2}e^{-(t-2)} + \frac{1}{6}e^{-3(t-2)}\right]\cdot u(t-2) - \left[\frac{1}{3} - \frac{1}{2}e^{-(t-4)} + \frac{1}{6}e^{-3(t-4)}\right]\cdot u(t-4) + \left[\frac{1}{3} - \frac{1}{2}e^{-(t-6)} + \frac{1}{6}e^{-3(t-6)}\right]\cdot u(t-6)$$

3a)

$$y = e^{-2t}\cdot\cos(3t) + \frac{2}{3}\cdot e^{-2t}\cdot\sin(3t) + \frac{1}{3}\cdot e^{-2(t-\pi)}\cdot\sin\left[3(t-\pi)\right]\cdot u(t-\pi) + \frac{1}{3}\cdot e^{-2(t-3\pi)}\cdot\sin\left[3(t-3\pi)\right]\cdot u(t-3\pi)$$

3b)

$$y = -\frac{1}{25}e^{t} - \frac{1}{5}te^{t} + \frac{1}{25}e^{6t} + \left[-\frac{1}{5}e^{t-2} + \frac{1}{5}e^{6(t-2)}\right]u(t-2) + \left[-\frac{1}{5}e^{t-4} + \frac{1}{5}e^{6(t-4)}\right]u(t-4)$$

4a)

$$x = \frac{4}{5}e^{2t} - \frac{4}{5}\cos t - \frac{8}{5}\sin t$$
$$y = 1 - 2t - t^2 + \frac{1}{5}e^{2t} - \frac{6}{5}\cos t + \frac{8}{5}\sin t$$

4b)

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