

$$s^2 Y + Y = \mathcal{L}\{1 - u(t - \pi)\}$$

$$= \frac{1}{s} - e^{-\pi s} \frac{1}{s}$$

$$= (1 - e^{-\pi s}) \frac{1}{s}$$

$$Y = (1 - e^{-\pi s}) \frac{1}{s(s^2 + 1)}$$

Solution to  
Quiz 12  
Math 2150  
Fall 2006

$$\frac{1}{s(s^2 + 1)} = \frac{A}{s} + \frac{Bs + C}{s^2 + 1}$$

$$1 = A(s^2 + 1) + (Bs + C)s$$

$$s = 0 \quad 1 = A$$

$$s = 1 \quad 1 = 2A + B + C$$

$$B + C = 1 - 2 = -1$$

$$s = -1 \quad 1 = 2A - (-B + C)$$

$$B - C = 1 - 2 = -1$$

$$\begin{array}{r} 2B = -2 \quad C = 0 \\ \hline B = -1 \end{array}$$

$$Y = (1 - e^{-\pi s}) \left( \frac{1}{s} - \frac{s}{s^2 + 1} \right)$$

$$y = 1 - \cos t - u(t - \pi)(1 - \cos(t - \pi))$$

$$= \begin{cases} 1 - \cos t & t < \pi \\ -\cos t + \cos(t - \pi) & t > \pi \end{cases} = \begin{cases} 1 - \cos t & t < \pi \\ -2\cos t & t > \pi \end{cases}$$

