ENGR 3323: Signals and Systems

HW 4_Ch2 Answer Keys

1a) $(1-e^{-2t})\,u(t)$ **1b)** $(e^{-t}-e^{-2t})\,u(t)$ **1c)** $\frac{0.914e^{-2t}-\cos(3t-326^{o})}{\sqrt{13}}$

d) $(1-e^{-2t})$ for $0<t<2$ and $53.6e^{-2t}$ for $t>2$ **e)** $e^{-2t}\,u(t)$ **f)** $e^{-2(t-2)}\,u(t-2)$

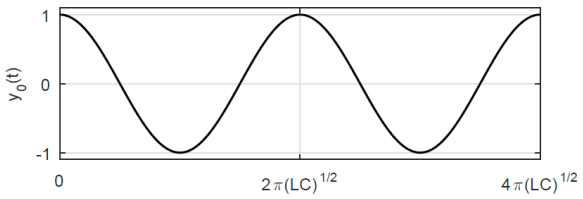
2a) $y(-1)=0;\quad y(0)=1;\quad y(1)=1;\quad y(2)=1;\quad y(3)=1;\quad y(4)=1;\quad y(5)=1;\quad y(6)=0;$

2b)

$$y(t)=\begin{cases}0 & t<-1\\ t+1 & -1\le t<0\\ 1 & 0\le t<5\\ 6-t & 5\le t<6\\ 0 & t\ge 6\end{cases}$$

3a) $\frac{d^2y}{dt^2}+\frac{1}{LC}y(t)=\frac{1}{LC}x(t)$ **3b)** $\lambda_{1,2}=\frac{\pm j}{\sqrt{LC}}$ **3c)** $y_0(t)=\cos\left(\frac{t}{\sqrt{LC}}\right)$

3d)



3e) The zero state response

$$x(t)*h(t)=\left(0.5\sin(t)-0.5\cos(t)+0.5e^{-t}\right)u(t)$$

The total response

$$y(t)=\left(0.5\sin(t)+0.5\cos(t)+0.5e^{-t}\right)u(t)$$

4a) The system is BIBO stable and also asymptptically stable

4b) The system is BIBO stable and marginally stable

4c) The system is BIBO unstable and asymptptically unstable

4c) The system is BIBO unstable and asymptptically unstable

5)

$$\lambda=\frac{-2\pm\sqrt{4-13}}{2}=-1\pm j\frac{3}{2}.$$

$\cos(\omega t)$ will produce a strong response when $\omega=\pm\frac{3}{2}$ rad/s.