

ECE-205 : Dynamical Systems

Homework #8

Due : Tuesday November 1 at the beginning of class

Exam 3, Thursday November 3

- 1) Chapter 7, Problem 7.9
- 2) Chapter 7, Problem 7.10
- 3) Chapter 5, Problem 5.12 (Convolution)
- 4) Chapter 5, Problem 5.15 (Convolution)
- 5) Chapter 7, Problem 7.12 (Matlab)
- 6) For the following transfer functions, determine both the **impulse response** and the **unit step response**.

$$H(s) = \frac{s}{(s+1)(s+2)^2} \quad H(s) = \frac{1}{(2s+1)(3s+2)}$$
$$H(s) = \frac{2}{s^2 + 8s + 25} \quad H(s) = \frac{s+2}{s^2 + 2s + 4}$$

Scrambled Answers:

$$h(t) = \frac{2}{3} e^{-4t} \sin(3t)u(t), h(t) = -e^{-t}u(t) + e^{-2t}u(t) + 2te^{-2t}u(t), h(t) = e^{-t/2}u(t) - e^{-2t/3}u(t),$$

$$h(t) = e^{-t} \cos(\sqrt{3}t)u(t) + \frac{1}{\sqrt{3}} e^{-t} \sin(\sqrt{3}t)u(t), y(t) = \frac{1}{2}u(t) - 2e^{-t/2}u(t) + \frac{3}{2}e^{-2t/3}u(t),$$

$$y(t) = \frac{1}{2}u(t) + \frac{1}{2\sqrt{3}} e^{-t} \sin(\sqrt{3}t)u(t) - \frac{1}{2} e^{-t} \cos(\sqrt{3}t)u(t), y(t) = e^{-t}u(t) - e^{-2t}u(t) - te^{-2t}u(t),$$

$$y(t) = \frac{2}{25}u(t) - \frac{8}{75}e^{-4t} \sin(3t)u(t) - \frac{2}{25}e^{-4t} \cos(3t)u(t)$$