# EE 2000 Assignment # 13

(taken from Dr. Jingxian Wu, University of Arkansas, 2020.)

1. Find the inverse Laplace transform

   (a) $\frac{s+2}{s^2-s-2}$

   (b) $\frac{s^2}{s^2+3s+2}$

   (c) $\frac{s}{s^2+2s+7}$.

   (d) $\frac{1}{(s+2)^2}$

2. Consider a system with input $x(t)$ and output $y(t)$ described in the following equations. Find the impulse response $h(t)$.

$$x(t) = \exp(-2t)u(t) \quad (1)$$
$$y(t) = [\exp(-t) - 3\exp(-2t)]u(t) \quad (2)$$

3. Consider an LTI system described by the following equation (the system is initially relaxed)

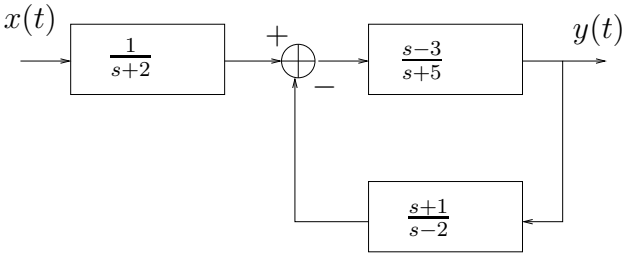
$$y''(t) + 4y'(t) + 3y(t) = 2x(t) - 3x'(t) \quad (3)$$

   (a) Find the transfer function $H(s)$

   (b) Draw the first canonical form representation of the system

   (c) Is the system BIBO stable?

4. The block diagram of a system is represented in the figure shown in the next page. Find the transfer function of the system. Is the system BIBO stable?


$x(t)$
$\frac{1}{s+2}$
+
−
$\frac{s-3}{s+5}$
$y(t)$
$\frac{s+1}{s-2}$