ELEG 3124 Assignment # 13

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?