

EE422G Homework #2 (13 points)

Due January 25, 2007

1. (2 points) Find the Laplace Transform and the corresponding ROC for the following time signals:
 - a. $x(t) = u(t) + e^{-3t}u(t)$
 - b. $x(t) = e^{-4t}u(t) - e^{-4(t-1)}u(t-1)$

2. (2 points) Prove the Time-Delay Theorem

3. (3 points) Find the time signals whose Laplace Transforms are as follows:
 - a. $X_1(s) = \frac{1}{s} + \frac{1}{s+10}$
 - b. $X_2(s) = \frac{s+1}{s} + \frac{1}{s+2}$
 - c. $X_3(s) = \frac{1}{s+5} - \frac{1}{s+7}$

4. (2 points) List all the distinctive poles and zeros of the following Laplace Transforms and sketch their Region of Absolute Convergence.
 - a. $X(s) = \frac{(s-2)(s-3)}{(s-4)(s+2+4i)}$
 - b. $X(s) = \frac{s^2 - 2s + 1}{s-2}$

5. (2 points) Explain whether the Fourier Transforms of the signals can be derived from their Laplace Transforms given below. If so, write down the expressions for the Fourier Transforms.
 - a. $X(s) = \frac{s^2 - 2s + 1}{s-2}$
 - b. $X(s) = \frac{s+10}{s^2 + 9s + 20}$

6. (2 points) Find the Laplace Transform of the following signals using Matlab. Please show all your commands and responses from Matlab.
 - a. $x(t) = t^2 \cos(\omega t)e^{-\alpha t}u(t)$
 - b. $x(t) = \ln(\omega t)u(t)$