

ELEC 309

Signals and Systems

Homework 8 Assignment

Complex-Domain Analysis of Signals

1. Determine the unilateral Laplace transform of the following continuous-time signals using **only** basic Laplace transforms and Laplace transform properties (**do not use the unilateral Laplace transform integral!**):

(a)

$$x(t) = u(t-1) * e^{-2t}u(t-1)$$

(b)

$$x(t) = \int_0^t e^{-3\tau} \cos(2\tau) d\tau$$

(c)

$$x(t) = t \frac{d}{dt} [e^{-t} \cos(t)u(t)]$$

2. Determine the continuous-time signals for the following unilateral Laplace transforms:

(a)

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

(b)

$$X(s) = \frac{3s^2+10s+10}{(s+2)(s^2+6s+10)}$$

(c)

$$X(s) = \frac{s^2-3}{(s+2)(s^2+2s+1)}$$

3. Determine the unilateral z transform of the following discrete-time signals using **only** basic z transforms and z transform properties (**do not use the unilateral z transform summation!**):

(a)

$$x[n] = u[-n]$$

(b)

$$x[n] = \left(\frac{1}{2}\right)^n u[n] * 2^n u[-n-1]$$

(c)

$$x[n] = n \left(\left(\frac{1}{2}\right)^n u[n] * \left(\frac{1}{4}\right)^n u[n-2] \right)$$