

NAME:

University of Massachusetts Lowell
Department of Electrical and Computer Engineering
EECE 5090 Linear Systems

OPEN BOOK Due: RETURN SOLN PDF via email by 1:00 pm EST TUES

1. Find the output $y(t)$ given the input $x(t) = e^{-t}u(t)$ and the Laplace transform of the linear-time invariant system is given by $H(s)$

$$H(s) = \frac{s + 2}{(s - 2)(s + 4)} \quad -4 < \text{Re}(s) < 2$$

- a. Find $X(s)$ and its ROC.
- b. Find $Y(s)$ and its ROC.
- c. Find $y(t)$ via contour integration. Draw the contours used in your evaluation.

2. Consider the causal discrete time system given by

$$y[n] = \beta y[n - 1] + x[n]$$

- a. Determine the transfer function $H(z) = Y(z)/X(z)$ and the ROC
- b. Find $y[n]$ given that $x[n] = \delta[n]$. Denote the ROC of $Y(z)$

3. Consider the Laplace transform of the time function $y(t, z)$ which is given by

$$Y(s, z) = \frac{1}{s + a + b/z}$$

where y is right handed in time and a, b are real and positive valued.

- a. Draw the ROC of Y in the s -plane
- b. Find $y(t, z)$.

4. Consider the discrete time signal

$$h[n] = \delta[n] + \beta \delta[n - 1]^*$$

- a. Draw $h[n]$
- b. Find $H(z)$ and its ROC
- c. Given $G(z) = 1/H(z)$ determine the ROC of G required to render $g[n]$ left-handed
- d. Find $g[n]$