

UNIVERSITY OF CALIFORNIA, RIVERSIDE
Department of Electrical and Computer Engineering
WINTER 2025
EE110B-SIGNALS AND SYSTEMS
HOMEWORK 6

Please turn in by Friday, February 28th, 2025, 11:59pm.

Problem 1: Determine the inverse z-transform of the following expressions:

a) $X(z) = \frac{1}{1-0.1z^{-1}}$ with $|z| > 0.1$

b) $X(z) = \frac{1}{1-0.1z^{-1}}$ with $|z| < 0.1$

c) $X(z) = \frac{0.5z^{-1}+0.1z^{-2}}{(1-0.3z^{-1})(1-0.4z^{-1})}$ with $0.3 < |z| < 0.4$

d) $X(z) = \cos(z^{-1})$ with $|z| > 0$. You need to research (or derive) the Taylor series expansion of $\cos(\cdot)$ for this one.

Problem 2: Let

$$x[n] = 0.5^n u[n]$$

and

$$y[n] = 0.4^n u[n] .$$

Determine the z-transform of

$$w[n] = (x[n] - 0.4x[n-1]) \star y[n] .$$

Do not forget to include the region of convergence in your answer.

Problem 3: Use long division to determine the signal whose z-transform is

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

with $|z| > 1$.