

EE3210 Signals and Systems

Tutorial 13

Problem 1: Let $x[n]$ be an absolutely summable signal with rational z -transform $X[z]$. If $X[z]$ is known to have a pole at $z = 1/2$, could $x[n]$ be

- (a) a finite-duration signal?
- (b) a left-sided signal?
- (c) a right-sided signal?
- (d) a two-sided signal?

Problem 2: Find the inverse z -transform of

$$X[z] = \frac{1 - \frac{1}{3}z^{-1}}{(1 - z^{-1})(1 + 2z^{-1})}$$

with the ROC specified as

- (a) $|z| > 2$
- (b) $|z| < 1$
- (c) $1 < |z| < 2$

Problem 3: Consider a signal $y[n]$ which is related to two signals $x_1[n]$ and $x_2[n]$ by

$$y[n] = x_1[n + 3] * x_2[-n + 1]$$

where

$$x_1[n] = \left(\frac{1}{2}\right)^n u[n] \quad \text{and} \quad x_2[n] = \left(\frac{1}{3}\right)^n u[n].$$

Determine the z -transform $Y[z]$ of $y[n]$.