

Assignment 1

EE3900 - Linear Systems and Signal Processing

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Z-transform

Oppenheim and Schafer

Problem 3.12(c) Sketch the pole-zero plot for

$$X_3(n) = \frac{1 + z^{-1} - 2z^{-2}}{1 - 13/6z^{-1} + z^2} \quad (1)$$

and shade the region of convergence?

Solution: Given that,

$$X_3(n) = \frac{1 + z^{-1} - 2z^{-2}}{1 - 13/6z^{-1} + z^2} \quad (2)$$

As we know that, the numerator gives us the zeros and denominator gives the poles of a Z-transform.

$$1 + z^{-1} - 2z^{-2} = 0 \quad (3)$$

On solving, we get the zeros are 1 and -2. Similarly,

$$1 - 13/6z^{-1} + z^2 = 0 \quad (4)$$

On solving, we get the poles are 2/3 and 3/2. Since the $x_3(n)$ is absolutely summable, the ROC must include the unit circle: $\frac{2}{3} < |x| < \frac{3}{2}$

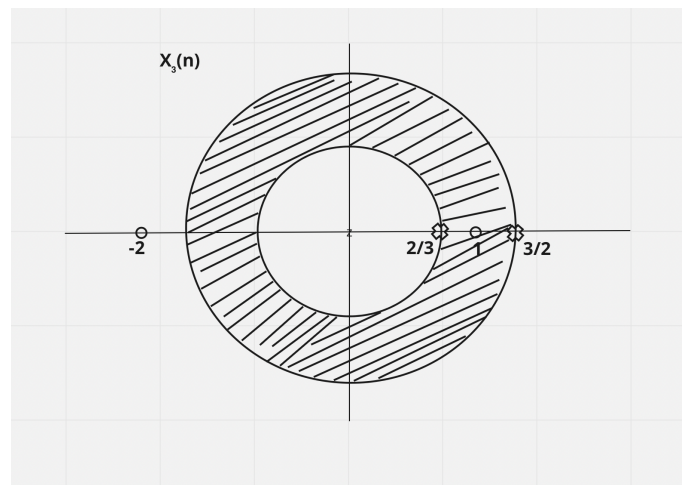


Fig. 0. Plot of Pole-zero