

Test 2

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Download the python codes from:

https://github.com/tanayyadav28/EE3900-Assignments/blob/main/Test_2/Test_2.py

Download the latex-tikz codes from:

https://github.com/tanayyadav28/EE3900-Assignments/blob/main/Test_2/Test_2.tex

Now,

$$Y(z) = \frac{z^2}{z^2 + \frac{1}{4}z - \frac{1}{8}} \quad (2.0.7)$$

$$\therefore Y(z) = \frac{z^2}{\left(z + \frac{1}{2}\right)\left(z - \frac{1}{4}\right)} \quad (2.0.8)$$

The ROC of $Y(z)$ is the intersection of ROCs of $X(z)$ and $H(z)$.

Therefore, the poles of $Y(z)$ are $\left\{-\frac{1}{2}, \frac{1}{4}\right\}$, the zero is at 0 and the ROC is $|z| > \frac{1}{2}$.

1 PROBLEM

[Q3.19 (a)]

For each of the following pairs of input z -transform $X[z]$ and system function $H[z]$, determine the ROC and the output z -transform $Y[z]$.

$$X(z) = \frac{1}{1 + \frac{1}{2}z^{-1}}, \quad |z| > \frac{1}{2}$$

$$H(z) = \frac{1}{1 - \frac{1}{4}z^{-1}}, \quad |z| > \frac{1}{4}$$

2 SOLUTION

$$X(z) = \frac{1}{1 + \frac{1}{2}z^{-1}}, |z| > \frac{1}{2} \quad (2.0.1)$$

$$H(z) = \frac{1}{1 - \frac{1}{4}z^{-1}}, |z| > \frac{1}{4} \quad (2.0.2)$$

System transfer function is given as:

$$H(z) = \frac{Y(z)}{X(z)} \quad (2.0.3)$$

$$\therefore Y(z) = X(z)H(z) \quad (2.0.4)$$

$$= \left(\frac{1}{1 + \frac{1}{2}z^{-1}} \right) \left(\frac{1}{1 - \frac{1}{4}z^{-1}} \right) \quad (2.0.5)$$

$$\therefore Y(z) = \frac{1}{1 + \frac{1}{4}z^{-1} - \frac{1}{8}z^{-2}} \quad (2.0.6)$$

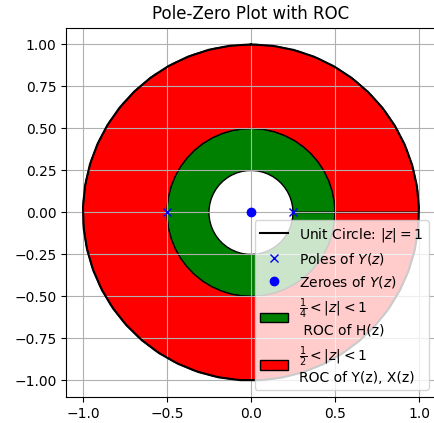


Fig. 0: Poles, Zeros and ROC of $Y(z)$