

Lab 2 – Z-Transform

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7.1 ROC, Causality, and Stability (function + script)

(a). The code is written and submitted in Github.

(f).

For First Order Feedback Systems,

Here if input $x[n] = \delta[n]$, then the output $h[n] = \alpha^n u[n]$

So, depending on the values of α , different impulse responses can be observed.

Case 1: $\alpha = 1$

Then, impulse response will be Unit step function.

Case 2: $0 < \alpha < 1$

Then, an exponentially decreasing function will be observed.

Case 3: $\alpha > 1$

Then, an exponentially increasing function will be observed.

Case 4: $\alpha = (-1)$

Then, alternating 1 and (-1) will be observed.

Case 5: $-1 < \alpha < 0$

Then, an exponentially decreasing function alternating between positive and negative values will be observed.

Case 6: $\alpha < -1$

Then, an exponentially increasing function alternating between positive and negative values will be observed.

7.3 LTI system with complex poles (script)

(b).

7.4 LTI system with multiple poles (script)

(a).

Wherever the magnitude shoots up it would represent the poles of the system. And wherever the magnitude of the response dies and becomes zeros would represent the Zeros.