

Report: Lab 2

Question 2:

(d) Frequency response:

Increases with increase in $\omega \rightarrow p > 0$.

Decreases with increase in $\omega \rightarrow p < 0$.

Impulse response:

For any system of form: $H(Z) = A / (1 - aZ^{-1})$

The impulse response $h[n] = (a)^n U[n]$.

Therefore, for p :

$|P| > 1 \rightarrow$ Increasing with ω .

$|P| < 1 \rightarrow$ Decreasing with ω .

$P < 0 \rightarrow$ Value Toggles between positive and negative for alternate N .

$P > 0 \rightarrow$ Only positive.

Question 3:

(a) Zeroes : $\cos(\Omega) + i\sin(\Omega)$
 $\cos(\Omega) - i\sin(\Omega)$

(b) Poles : $r\cos(\Omega) + ri\sin(\Omega)$
 $r\cos(\Omega) - ri\sin(\Omega)$

For $R=1.5$;

$\Omega = 60^\circ$

Zeroes: $0.5 + 0.866025i$ and $0.5 - 0.866025i$

Poles: $0.75 + 1.29904i$ and $0.75 - 1.29904i$

$$\Omega = 120^\circ$$

Zeros: $-0.5 + 0.866025i$ and $-0.5 - 0.866025i$

Poles: $-0.75 + 1.29904i$ and $-0.75 - 1.29904i$

(b) For Casualty: ROC must be outside a circle and extending to Inf

Stability: ROC must contain $|Z| = 1$.

The ROC of this system can be either $|Z| > r$ or $|Z| < r$

For Stability and Causality ROC $|Z| > r$ and $r < 1$.

(c) For a constant value of r as Ω increases the dip in the plot also shifts ahead, towards positive x axis.

Question 4:

Poles will be in conjugate pair.

There will be at-most 6 poles.