demo 08

Name: Sagar Patel

NETID: sp5894

Question 01

For the filter implemented in the demo program, what is the difference equation, transfer function, and impulse response? Use Matlab to plot the pole-zero diagram of the filter.

Answer:

We have,

$G = 0.8, b_0 = 1$

$Rate = 16000$

$delay = 0.05$

Now, we know that –

$N = \text{Rate} \times \text{delay} = 16000 \times 0.05 = 800$

$y(n) = b_0.x(n) + G.x(n - N)$

$\Rightarrow y(n) = x(n) + 0.8x(n - 800)$

After performing Z-transformation,

$Y(Z) = X(Z)[1 + 0.8Z^{-800}]$

$\therefore H(Z) = \frac{Y(Z)}{X(Z)} = 1 + 0.8Z^{-800}$

This is the difference equation and the transfer function.

MATLAB Code Implementation:

```
N= 800;
b=[1 zeros(1,N-1) 0.8];
a=[1 0];
figure(1);
zplane(b,a);
title('Pole-Zero plot');
```

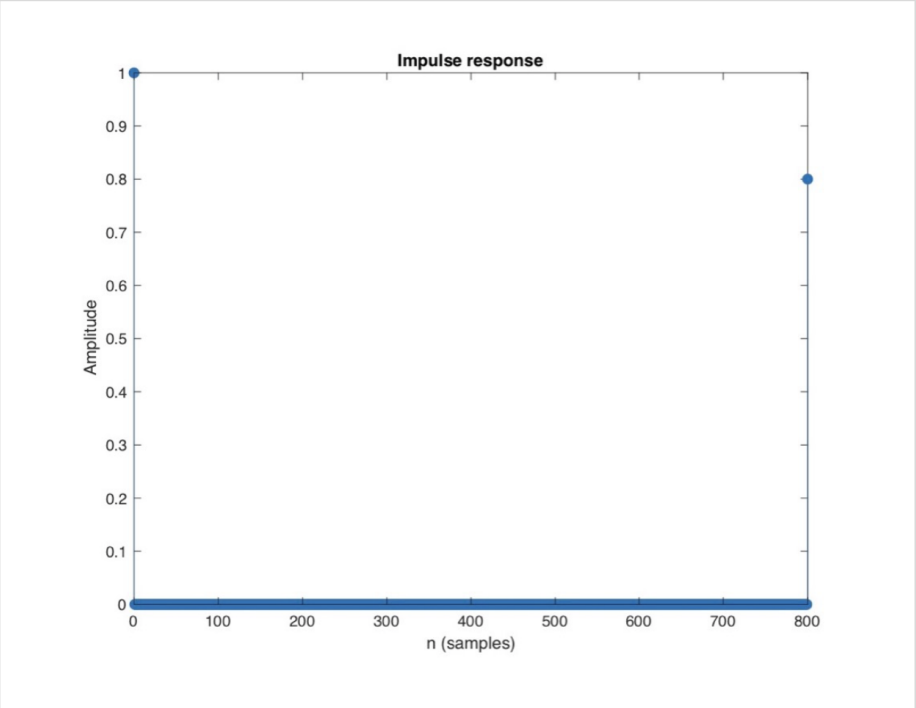

Figure 1: Impulse Response

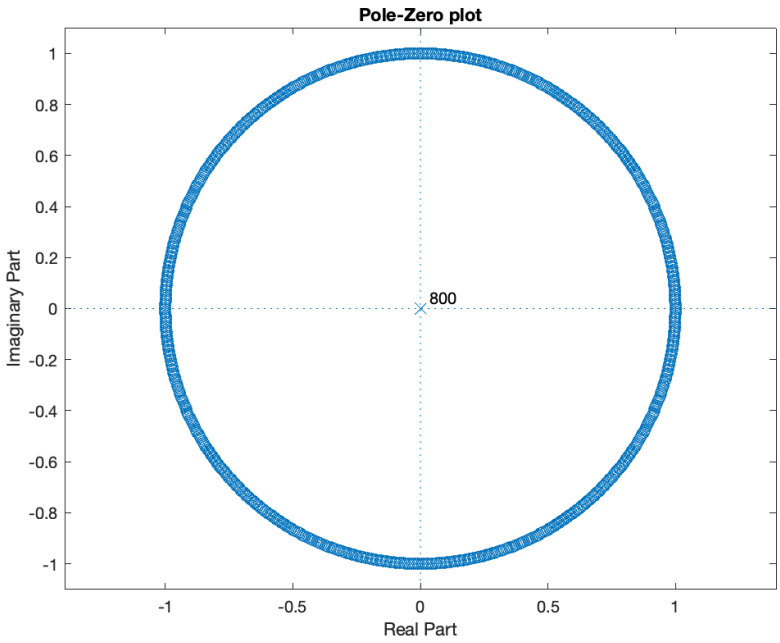

Figure 2: Pole-Zero Plot