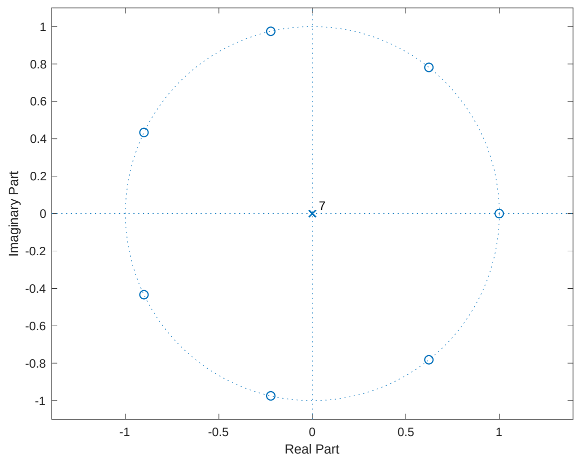
Von Kaukeano
TUID: 915596703
Practicum 2

a.

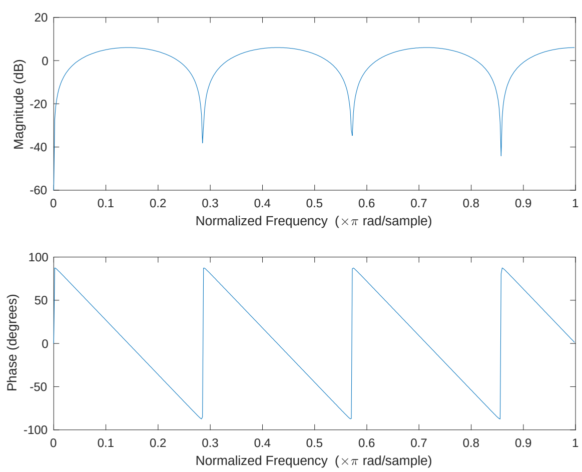


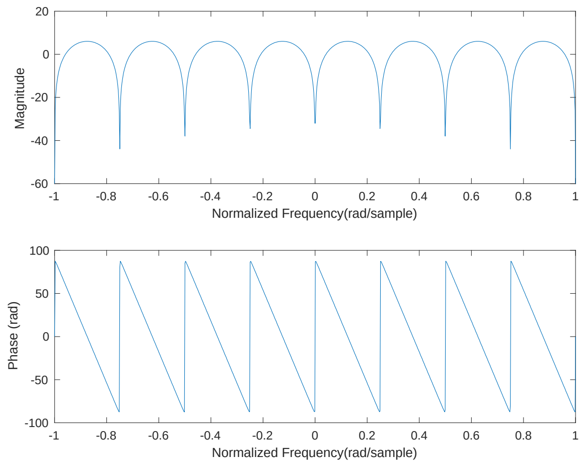

```
roots =

  -0.9008 + 0.4338i
  -0.9008 - 0.4338i
  -0.2225 + 0.9748i
  -0.2225 - 0.9748i
   0.9999 + 0.0000i
   0.6234 + 0.7817i
   0.6234 - 0.7817i
```

The zero pole diagram shows that the magnitude response will have eight zeros all very close to the unit circle. There will be a zero at approximately 0, .55pi, .27pi and .85pi which will pull the magnitude down in the plot.

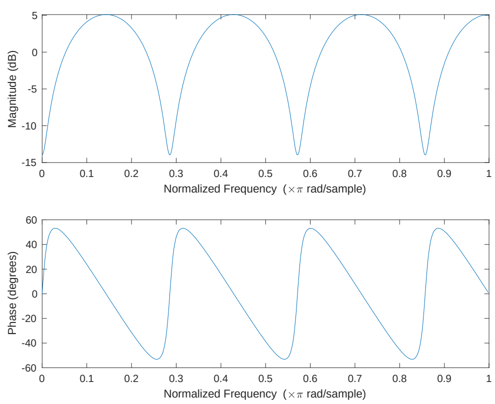
b.

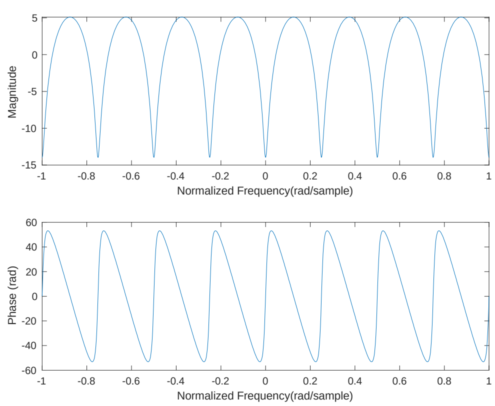




Above is a comparison to the freqz function plot. The second is the hand calculated version. The plots match which means it was calculated correctly.

c.

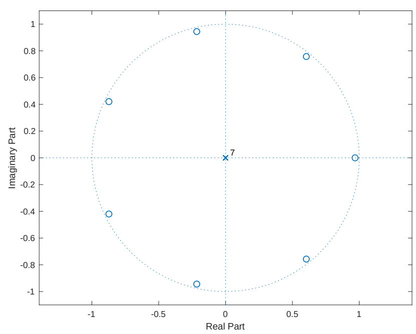


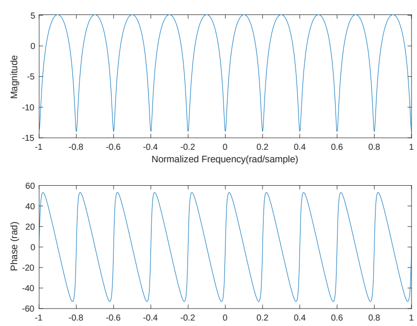


Above is the magnitude and phase plot when a is changed to .8. It compares the response to the freqz function which match again. The magnitude decrease and the phase becomes nonlinear.

d. The phase becomes nonlinear because when doing the calculations for the generalized linear phase system the value of alpha changes. The calculations are done by converting and pulling an e^-jwn term out and using eulers identity to find the magnitude and phase. When a = .999 alpha is ~.5 and when a = .8 apha is ~ .4. The value will give a nonlinear phase compared to .5 when finding the phase response at different frequencies.

e.





When changing keeping a = -.8 but changing the delay to h = $1-.8z^{-10}$ we receive the very similar magnitude responses but with more zeros. The phase is almost identical just by delaying the system by an even M value. The phase is not linear because I still used the value of .8.

```
%% Practicum 2
% Von Kaukeano

clc;
clear;

a = .999
h = [1 0 0 0 0 0 0 -a]

roots = roots(h)

figure(1)
zplane(h,1)
figure(2)
freqz(h,1)

%%
N = 1000;
w = linspace(-pi, pi, N);
H = 1 - a * exp(-j*8*w);
Ha = abs(H);
Db  = 20*log10(Ha);
wn = w/pi;

figure(3)
subplot(211)
plot(wn,Db)
grid
ylabel('Magnitude')
xlabel('Normalized Frequency(rad/sample)')
subplot(212)
plot(wn,angle(H)*180/pi)
grid
ylabel('Phase (rad)')
xlabel('Normalized Frequency(rad/sample)')
```