PROBLEM:

Pole-Zero Plot
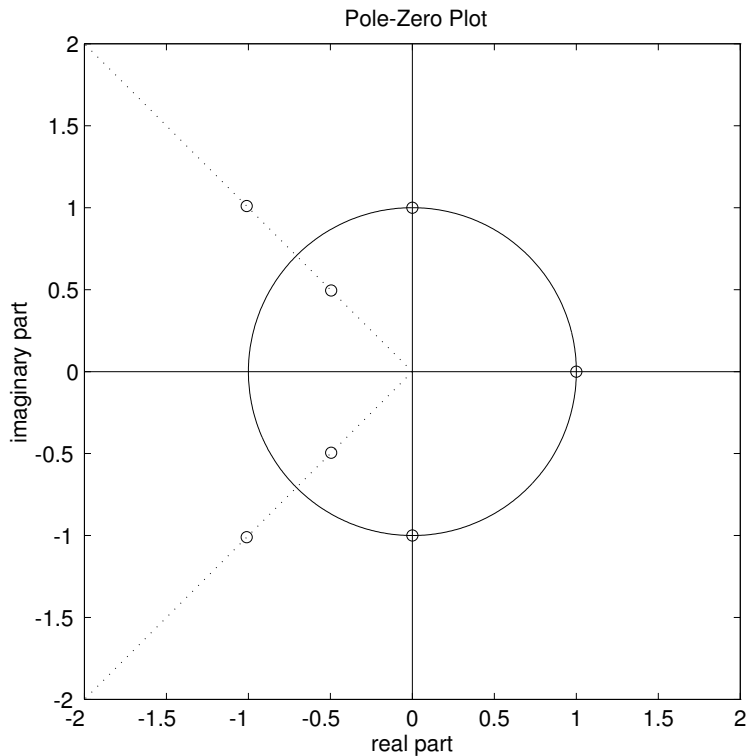
The above figure gives the z-plane plot of the zeros of the system function $H(z)$ of a LTI discrete-time system. The input of the system is the sequence $x[n]$ and the output is $y[n]$.

(a) If the input is of the form

$$x[n] = Ae^{j\phi}e^{j\hat{\omega}n}$$

for what values of $\hat{\omega}$ will the output be zero for all n? $\boxed{\hat{\omega} = }$

(b) If it is known that the input $x[n]$ and output $y[n]$ are related by a difference equation of the form

$$y[n] = \sum_{k=0}^{M} b_k x[n-k]$$

How many poles does $H(z)$ have? $\boxed{}$ Mark their locations in the z-plane above.

(c) From just looking at the pole-zero plot above, sketch the magnitude of the frequency response $|H(e^{j\hat{\omega}})|$ for $-\pi < \hat{\omega} < \pi$. Be sure to label your plot with as much information as possible.