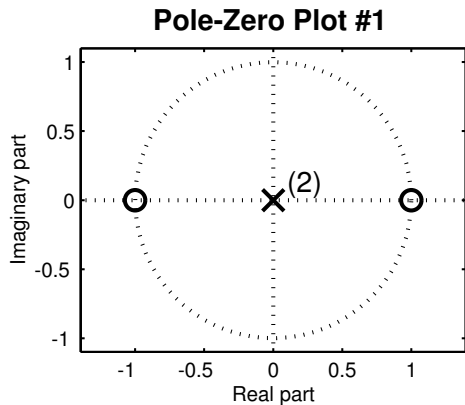


PROBLEM:

Questions about the frequency response of an FIR filter:

- (a) Determine a formula for the frequency response of an FIR filter defined by the pole-zero plot below:



- (b) For the FIR filter in part (a), write a simplified version of the frequency response $H(e^{j\hat{\omega}})$ and use it to prove that the maximum value of the frequency response magnitude will be at $\hat{\omega} = \pm\pi/2$. If convenient, draw a sketch of $|H(e^{j\hat{\omega}})|$.
- (c) The pole-zero plot does not define the scaling of the frequency response. Therefore, you can rescale $H(e^{j\hat{\omega}})$ with a scaling constant β so that the *maximum* value of the frequency response $\beta H(e^{j\hat{\omega}})$ will be equal to one. Determine the numerical value of the scaling constant β for the frequency response from parts (a) and (b).