Peak Filter Exercise

The magnitude response of a second order recursive filter is shown in this figure. The peak is at 0.2 pi radians/sample (0.1 cycles/sample).

This filter is similar to the second order recursive notch filter. But, instead of attenuating a given frequency, this filter amplifies a given frequency. This is a peaking filter. How should the poles and zeros of the notch filter be modified to achieve amplification instead of attenuation?

Design a second-order recursive filter having a frequency response magnitude like the one in the figure above. It does not have to be identical, but it should have a peak at 0.1 cycles/samples and it should be relatively flat away from that frequency. In MATLAB, plot the pole/zero diagram, impulse response, and frequency response of your second-order filter.

Magnitude response