2.38 Consider the following linear discrete-time system. Use GUI module *g_system* with to plot the magnitude response and the phase response. Use $f_s = 100$ Hz, and use the dB scale for the magnitude response.
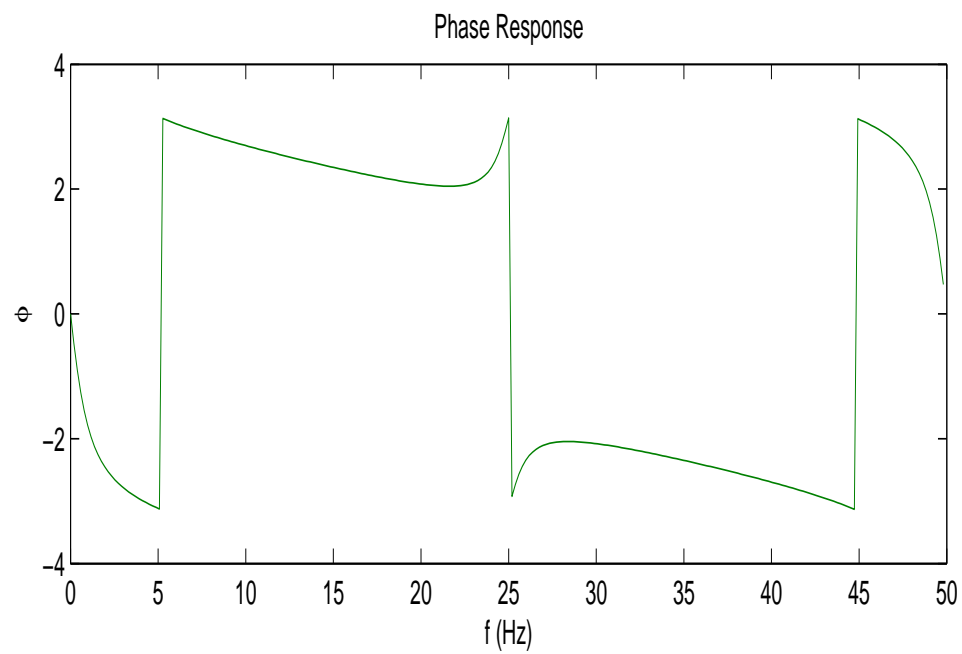
$$H(z) = \frac{5(z^2 + 0.9)}{(z^2 - 0.9)^2}$$

Solution

Expressing the transfer function in terms of negative powers of z yields

$$\begin{aligned} H(z) &= \frac{5(z^2 + 0.9)}{z^4 - 1.8z^2 + 0.81} \\ &= \frac{5z^{-2} + 4.5z^{-4}}{1 - 1.8z^{-2} + 0.81z^{-4}} \end{aligned}$$

Magnitude Response
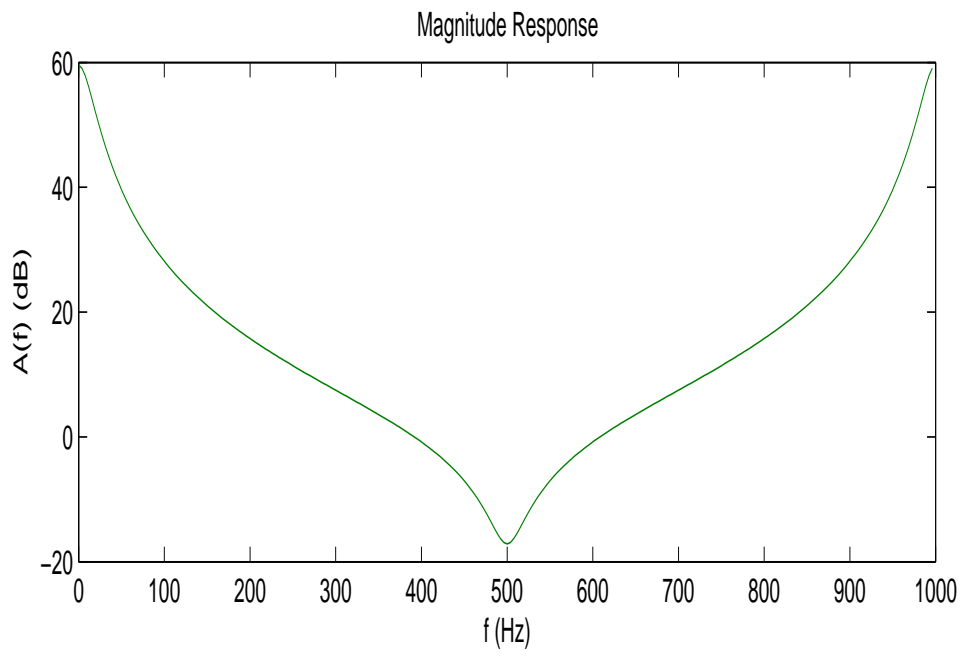
Magnitude Response

Phase Response

Phase Response