PROBLEM:

Suppose that a system is defined by the following operator

$$H(z) = (1 - z^{-1})(1 + z^{-2})(1 + z^{-1})$$

- (a) Write the time-domain description of this system—in the form of a difference equation.
- (b) Write the formula for the frequency response of the system.
- (c) Derive simple formulas for the magnitude response versus $\hat{\omega}$, and the phase response versus $\hat{\omega}$. These formulas must contain no complex terms and no square roots.
- (d) This system can "block" certain input signals. For which input frequencies $\hat{\omega}_{\circ}$, is the response to $x[n] = \cos(\hat{\omega}_{\circ}n)$ equal to zero?
- (e) When the input to the system is $x[n] = \cos(\pi n/3)$ determine the output signal y[n] in the form:

$$A\cos(\hat{\omega}_{\circ}n + \phi)$$

Give numerical values for the constants A, $\hat{\omega}_{\circ}$ and ϕ .