## PROBLEM:

Suppose that a system is defined by the following operator

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

(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 $\hat{\omega}_{o}$, is the response to $x[n]=\cos \left(\hat{\omega}_{\circ} n\right)$ 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:

$$
A \cos \left(\hat{\omega}_{o} n+\phi\right)
$$

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

