PROBLEM:

Suppose that a system is defined by the following operator

$$H(z) = (1 - z^{-1}) \frac{1 + z^{-4}}{1 - 0.8z^{-2}}$$

- (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 a simple formula for the magnitude squared of $\mathcal{H}(\hat{\omega})$ response versus $\hat{\omega}$.
- (d) This system can "block" certain input signals. For which input frequencies ω_{\circ} , is the response to $x[n] = \cos(\omega_{\circ}n)$ 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:

 $A\cos(\omega_{\circ}n+\phi)$

Give numerical values for the constants A, ω_{\circ} and ϕ .

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