

PROBLEM:

For each of the following frequency response, pick one of the representations below that defines *exactly* the same LTI system. Write your answer $S_1, S_2, S_3, S_4, S_5,$ or $S_6,$ in the box next to each frequency response. In addition, evaluate the frequency response at $\hat{\omega} = 0, \pm\pi$ and $\hat{\omega} = \pm\frac{1}{2}\pi$ as requested for each case; *simplify* the answer to **polar form** and write it in the space provided.

ANS = $\mathcal{H}(\hat{\omega}) = 1 - e^{-j2\hat{\omega}}$

$\mathcal{H}(\frac{1}{2}\pi) =$

ANS = $\mathcal{H}(\hat{\omega}) = e^{-j\hat{\omega}} - e^{-j3\hat{\omega}}$

$\mathcal{H}(\pi) =$

ANS = $\mathcal{H}(\hat{\omega}) = e^{-j\hat{\omega}} (2 \cos(\hat{\omega}))$

$\mathcal{H}(0) =$

ANS = $\mathcal{H}(\hat{\omega}) = -e^{-j2\hat{\omega}}$

$\mathcal{H}(0) =$

POSSIBLE ANSWERS: (impulse response, filter coefficients or difference equation)

$S_1 : b_k = \{0, 1, 0, -1\}$

$S_2 : y[n] = x[n] + x[n - 2]$

$S_3 : h[n] = \delta[n] + \delta[n - 1] + \delta[n - 2]$

$S_4 : h[n] = -\delta[n - 2]$

$S_5 : y[n] = x[n - 1] + x[n - 3]$

$S_6 : b_k = \{1, 0, -1\}$