PROBLEM:

For each of the following frequency responses, 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 = $\mathcal{H}(\hat{\omega}) = e^{-j\hat{\omega}} + e^{-j3\hat{\omega}}$

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

ANS = $\mathcal{H}(\hat{\omega}) = e^{-j2\hat{\omega}}(2j\sin(\hat{\omega}))$

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

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

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

ANS = $\mathcal{H}(\hat{\omega}) = e^{-j3\hat{\omega}/2}(2j\sin(3\hat{\omega}/2))$

$\mathcal{H}(0) =$

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

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

S_2 : $h[n] = \delta[n] + \delta[n-3]$

S_3 : $h[n] = \delta[n-1] + \delta[n-3]$

S_4 : $y[n] = x[n] - x[n-3]$

S_5 : $b_k = \{0,\ 1,\ 0,\ -1\}$

S_6 : $y[n] = x[n] + x[n-1] + x[n-2]$