

PROBLEM:

Circle the correct answer to each of these short answer questions (3 pts. each):

1. A particular system may be viewed as a cascade of two systems whose separate system functions are $H_1(z) = 1 - z^{-1}$ and $H_2(z) = 1 + z^{-2}$. Determine $H(z)$, the overall system function.

(a) $H(z) = 1 + z^{-1} + z^{-2} + z^{-3}$

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

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

(d) $H(z) = 1 - z^{-1} + z^{-2} - z^{-3}$

2. Pick the correct frequency response for the FIR filter: $y[n] = x[n] - x[n - 1]$

(a) $\delta[n] - \delta[n - 1]$

(b) $\sin(\frac{1}{2}\hat{\omega})$

(c) $2e^{-j(\hat{\omega}-\pi)/2} \sin(\frac{1}{2}\hat{\omega})$

(d) $|2 \sin(\frac{1}{2}\hat{\omega})|$

(e) none of the above

3. If $H(z) = z^{-3}$, the filter has a frequency response (magnitude) that is:

(a) constant for all $\hat{\omega}$

(b) a lowpass filter

(c) a highpass filter

(d) a bandpass filter

(e) equal to $\delta[n - 3]$

4. If $H(z) = \frac{z^{-3}}{1 - 0.75z^{-1}}$, the value of the frequency response at $\hat{\omega} = \frac{1}{2}\pi$ is equal to

(a) zero

(b) $0.8e^{j0.295\pi}$

(c) $0.8e^{-j0.295\pi}$

(d) $0.2e^{j0.5\pi}$

(e) 4