

Test 3 - No.1

DSP

Exercises

1. Consider the system described by the following system function:

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

- a. (1p) Draw the pole-zero diagram
- b. (2p) Sketch the amplitude response $|H(\omega)|$ and specify what kind of filter this is
- c. (3p) Compute the amplitude response $|H(\omega)|$ and the phase response $\angle H(\omega)$ of the filter
- d. (2p) Compute the output $y[n]$ if the input signal is $x[n] = 2 \cos(\frac{\pi}{2}n - \frac{\pi}{4})$, $n \in \mathbb{Z}$
- e. (1p) Is this a linear-phase system? Justify the answer.