Test 2 - No.1

DSP

Exercises

1. Consider the system described by the following difference equation:

$$y[n] = 0.9\ y[n-1] + 0.5\ x[n] - 0.4\ x[n-1]$$

   a. (3p) Find the system function $H(z)$

2. A causal system has the system function

$$H(z) = \frac{3}{(1 - 0.5z^{-1})(1 - 0.7z^{-1})}$$

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   a. (2p) Indicate the poles and the zeros, and draw the pole-zero diagram (with the unit circle)
   b. (4p) Find the impulse response $h[n]$

It is known that:

$$a^n \cdot u[n] \quad \overset{\text{Z}}{\longleftrightarrow} \quad \frac{1}{1 - a \cdot z^{-1}} = \frac{z}{z - a}, ROC : |z| > |a|$$

$$-a^n \cdot u[-n-1] \quad \overset{\text{Z}}{\longleftrightarrow} \quad \frac{1}{1 - a \cdot z^{-1}} = \frac{z}{z - a}, ROC : |z| < |a|$$