Systems Described by Linear Constant-Coefficient Difference Equations

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The Difference Equation

This laboratory report constantly refers to the difference equation in (1)

$$y(n) = y(n-1) - 0.8y(n-2) + x(n) \tag{1}$$

We can represent it as a z-plane transfer function through the following steps:

$$\begin{aligned} Z\{y(n)\} &= Z\{y(n-1) - 0.8y(n-2) + x(n)\} \\ Y &= z^{-1}Y - 0.8z^{-2}Y + X \\ Y - z^{-1}Y + 0.8z^{-2}Y &= X \\ Y\left(1 - z^{-1} + 0.8z^{-2}\right) &= X \\ \frac{Y}{X} &= \frac{1}{1 - z^{-1} + 0.8z^{-2}} \end{aligned}$$

Essentially we can represent this difference equation as a transfer function with numerator coefficients $b = [1]$, and denominator coefficients $a = [1, -1, 0.8]$.

Impulse Response