

I&J 4.11

4.11 For the discrete-time system shown in Figure 4.17, obtain the difference equation relating the output, $y(n)$, and the input, $x(n)$. Derive its transfer function, $H(z)$.

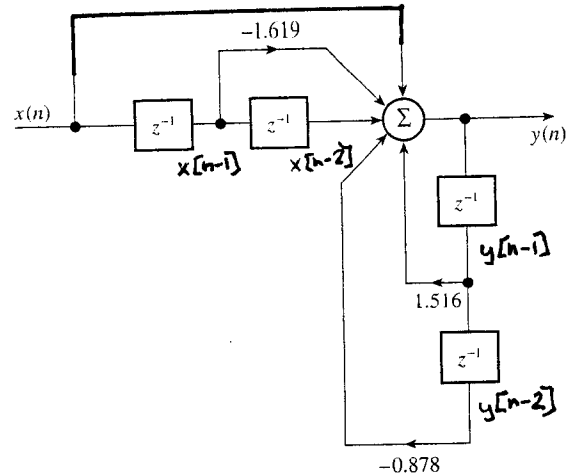


Figure 4.17 Block diagram for the discrete-time system of Problem 4.11.

Diff Eq.

$$y[n] = x[n] + -1.619x[n-1] + x[n-2] + 1.516y[n-1] - 0.878y[n-2]$$

Z-Transform

$$Y(z) = X(z) - 1.619z^{-1}X(z) + z^{-2}X(z) + 1.516z^{-1}Y(z) - 0.878z^{-2}Y(z)$$

$$Y(z)(1 - 1.516z^{-1} + 0.878z^{-2}) = X(z)(1 - 1.619z^{-1} + z^{-2})$$

Transfer Function

$$H(z) = \frac{Y(z)}{X(z)} = \frac{1 - 1.619z^{-1} + z^{-2}}{1 - 1.516z^{-1} + 0.878z^{-2}}$$

From here: - can you find the poles and zeros?

- pole/zero plot in Z-plane?

- is this system stable

For I&J 4.18

-- see lesson17.m AND Mitra_Z_table_Examples (last page) for examples...