Lect 2 Example 2.4

Q. $\frac{Y(z)}{U(z)} = \frac{1}{z^2 - 1.7z + 0.72} = \frac{10}{z-0.9} + \frac{-10}{z-0.8}$

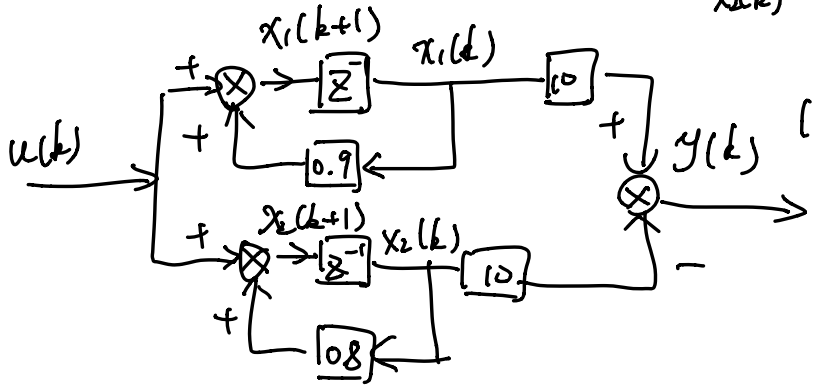
画框图，写 state-model

Solution

$$\frac{Y(z)}{U(z)} = \frac{10z^{-1}}{1-0.9z^{-1}} + \frac{-10z^{-1}}{1-0.8z^{-1}}$$

$$x_1(k) = \frac{Y_1(z)}{10} = \frac{z^{-1}}{1-0.9z^{-1}} U(z)$$

$$x_2(k) = -\frac{Y_2(z)}{10} = \frac{z^{-1}}{1-0.8z^{-1}} U(z)$$



$$[1-0.9z^{-1}]x_1(k) = z^{-1}u(k)$$

$$x_1(k) - 0.9z^{-1}x_1(k) = z^{-1}u(k)$$

$$x_1(k) = 0.9z^{-1}x_1(k) + z^{-1}u(k)$$

$$x_1(k+1) = 0.9x_1(k) + u(k)$$

$$x_2(k+1) = 0.8x_2(k) + u(k)$$

$$y(k) = 10x_1(k) - 10x_2(k)$$

$$x(k+1) = \begin{bmatrix} 0.9 & 0 \\ 0 & 0.8 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(k)$$

$$y(k) = [10 \quad -10]\, x(k)$$