1. **5 points** Consider the difference equation

\[ y(n) = 0.5x(n - 2) + x(n - 1) + x(n). \] (1)

a. What state would you choose to obtain an \([A, b, c^T, d]\) representation for this system?

The state can be \( s(n) = [x(n - 1), x(n - 2)]^T \)

b. What is the \([A, b, c^T, d]\) representation for your choice of the state?

\[ A = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \quad b = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \quad c^T = [1 \ 0], \quad d = [1] \]

c. What is the zero-state impulse response \( h \) of the system (1)?

\[ h(0) = 1, h(1) = 1, h(2) = 0.5, h(n) = 0, n \geq 3. \]

2. **5 points** Plot \( y = h \ast x \) for signals \( h, x \) shown below. Carefully mark the values of \( y \).