

ECE-486 Homework 2, Spring 2009

1. Develop a recursive implementation of the time-varying linear discrete-time system characterized by

$$y(n) = \begin{cases} \frac{1}{n} \sum_{i=1}^n x(i), & n > 0 \\ 0, & n \leq 0 \end{cases}$$

2. Determine the impulse response of the LTI causal system described by the difference equation

$$y(n) - 0.35y(n-1) = x(n)$$

3. Determine the unit-step response of a LTI system characterized by an impulse response

$$h(n) = (-\alpha)^n u(n) \quad (0 < \alpha < 1)$$

4. Determine the impulse response of a LTI system described by

$$y(n) = y(n-1) + \frac{1}{10}(x(n) - x(n-10))$$

5. Consider a LTI system with impulse response

$$h(n) = \begin{cases} (0.5)^n & 0 \leq n \leq 4 \\ 0, & \text{elsewhere} \end{cases}$$

Determine an input $x(n)$ for $0 \leq n \leq 8$ that will generate the sequence

$$y(n) = \{\dots, 0, \frac{1}{4}, 2, 2.5, 3, 3, 3, 2, 1, 0, \dots\}$$