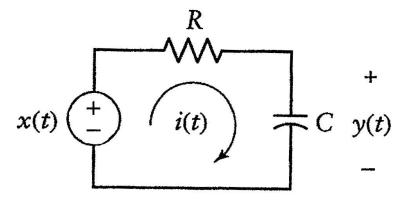
ELEC 309

Signals and Systems

Homework 3 Assignment

Time-Domain Analysis of LTI Systems



1. The RC-circuit above (with $R=100~\text{k}\Omega$ and $C=10\mu\text{F}$) is an LTI system with input signal x(t), output signal y(t), and impulse response given by

$$h(t) = e^{-t/RC}u(t).$$

- (a) Using convolution, determine the voltage across the capacitor if x(t) = u(t) u(t-2).
- (b) Using MATLAB, plot y(t) from part (a).

2. The input-output relationship for the LTI system that is a four-point moving-average system is given by

$$y[n] = \frac{1}{4} \sum_{k=0}^{3} x[n-k].$$

- (a) Determine the impulse response h[n] of this LTI system.
- (b) Using convolution, determine the response of the system when the input is the rectangular pulse given by

$$x[n] = u[n] - u[n - 10].$$

(c) Using MATLAB, plot y[n] from part (b).