

ECE 320 SIGNALS AND SYSTEMS II  
**Problem Set 10 – Practice Problems**  
Fall 2002

**Issued:** Thursday, December 5, 2002

**Due:** For practice only – not due

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**Problem 10.34** in *Oppenheim/Willsky/Nawab*

**Problem ECE320-12**

An LTI system is characterized by the system function:

$$H(z) = \frac{(1 - \frac{1}{2}z^{-2})}{(1 - \frac{1}{2}z^{-1})(1 - \frac{1}{4}z^{-1})} \quad |z| > \frac{1}{2}.$$

- (a) Determine the difference equation relating the system input  $x[n]$  to the system output  $y[n]$ .
- (b) Determine the step response of the system, i.e., the output when the input is  $x[n] = u[n]$ .
- (c) Is the system stable? Why or why not?
- (d) Is the system causal? Why or why not?

**Problem ECE320-13** (Exam problem from last term)

A discrete-time LTI system has the impulse response  $h[n]$  given below

$$h[n] = \left(\frac{5}{6}\right)^{n-1} u[n-1].$$

- (a) Is this system causal? Why or why not?
- (b) Is this system stable? Why or why not?
- (c) Determine the system function  $H(z)$  and its associated region of convergence.
- (d) Determine the output  $y[n]$  of the system when the input is  $x[n] = u[n]$ .