

Problem 22.1: On the same set of axes, sketch the magnitude response of the causal LTI systems characterized by the difference equations. Label both axes and all important features. Show the origin for context.

(a)  $y[n] - \frac{1}{4}y[n-1] = x[n]$

(b)  $y[n] - \frac{1}{2}y[n-1] = x[n]$

Problem 22.2: A discrete-time causal LTI system has frequency response  $H(e^{j\omega}) = \frac{8}{(8-6e^{-j\omega}+e^{-j2\omega})}$ .

(a) Determine a difference equation that relates input  $x[n]$  with output  $y[n]$ .

(b) Find the system's impulse response. Is the system stable?

(c) Use the convolution property of Fourier transforms to find the output  $y[n]$  when the input is  $x[n] = (1/2)^n u[n]$ .

Optional, but testable problems: 5.13, 5.19, 5.20, 5.36 (a,c).