Serial # ..O..

-1 point for not writing your serial #

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE207: Signals & Systems (122)
Quiz 7: Discrete-Time LTI Systems
Dr. Ali Hussein Muqaibel

Name: KEY

Assume we have an analogue signal, $y(t)=\sin \pi t + \cos 4\pi t$. (0.5 Hz, 2 Hz)

1. **What is the maximum frequency in the signal (Hz)?**

   $f_h = 2$ Hz

2. **What is the maximum sampling interval so the signal can be reconstructed correctly?**

   Nyquist freq. $= 2 \times f_h = 4$ samples/sec

   $\Rightarrow$ Max sampling interval $= \frac{1}{4} = 0.25$ sec.

3. **If the above signal is sampled at a rate of f_s=10 samples per second. How do we reconstruct the signal (mention all characteristics of the filter)?**

   An ideal lowpass filter with BW $= \frac{f_s}{2} = 5$ Hz and amplitude $= \frac{1}{f_s} = \frac{1}{10}$

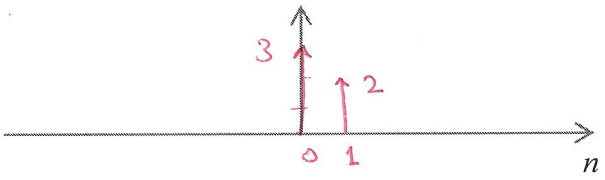
   $f_h \to f_s - f_h$
   $2 \to 8$

Consider an LTI system with input and output related by $y[n] = 2x[n-1] + 3x[n]$

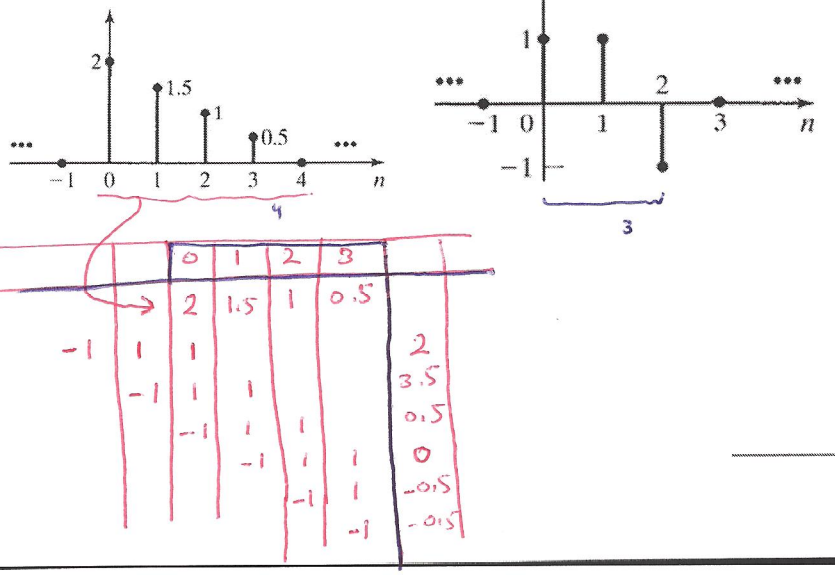
Find and sketch the systems impulse response $h[n]$.

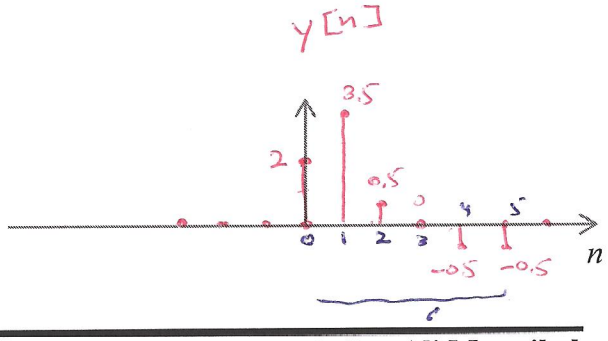
$h[n] = 2\delta[n-1] + 3\delta[n]$

The impulse response is the output when the input is $\delta[n]$



A system having and impulse response $h[n]$ is excited with a signal $x[n]$. Find and sketch the output $y[n]$ for all values of .





Good luck, Dr. Ali Muqaibel