

Homework No. 2
Due 16:20 pm, March 26, 2009

1. Find and sketch $y[n] = x[n] * h[n]$ of the following signals: (50%)

(1) $x[n] = (-1)^n(u[n] - u[n - 5])$ and $h[n] = u[n + 2]$.

(2) $x[n] = u[n] - u[-n]$ and $h[n] = \begin{cases} \left(\frac{1}{2}\right)^n, & n \geq 0 \\ 4^n, & n < 0 \end{cases}$.

2. Evaluate the following continuous-time convolution integrals: (25%)

$$y(t) = 2t^2[u(t + 1) - u(t - 1)] * 2u(t + 2).$$

3. The output of a discrete-time system is related to its input $x[n]$ as follows:

$$y[n] = a_0x[n] + a_1x[n - 1] + a_2x[n - 2] + a_3x[n - 3]$$

- (1) Show that the discrete-time system is BIBO stable for all $a_0, a_1, a_2,$ and a_3 .
(20%)
- (2) How far does the memory of the discrete-time system extend into the past?
(5%)