Department of Electrical Engineering
School of Science and Engineering

EE310 Signals and Systems

TUTORIAL 2

Tutorial 2-1

Determine the output of discrete-time LTI system described by the impulse response

$$h[n] = u[n] - u[n-4],$$

for an input $x[n]$ given by

$$x[n] = (1/2)^n \big(u[n+3] - u[n-3]\big).$$

Tutorial 2-2

Consider a signal given by

$$x(t) = u(t-1)\, e^{-2t}$$

which is input to a continuous-time LTI system with impulse response given by

$$h(t) = 3\, u(t-1) - 3\, u(t-4).$$

(a) Compute the system output $y(t) = x(t) * h(t)$.

(b) Draw $x(t), h(t)$ and $y(t)$ over the time interval $t \in [0, 8]$.

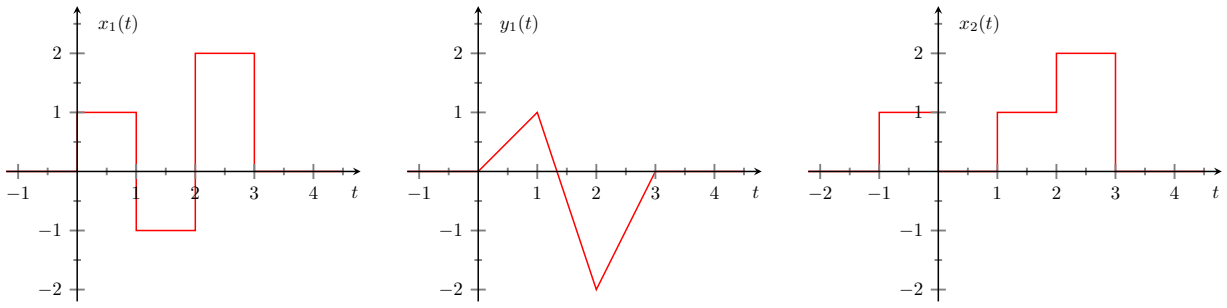
(c) Determine the convolution

$$g(t) = \frac{d\, x(t)}{dt} * h(t).$$

(d) How is $g(t)$ related to $y(t)$?

Tutorial 2-3

For an LTI system whose response to the signal $x_1(t)$ is the signal $y_1(t)$, determine the response, $y_2(t)$, of the system to the input $x_2(t)$, where $x_1(t)$, $x_2(t)$ and $y_1(t)$ are depicted below:



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