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

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

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

\[ h(t) = 3u(t - 1) - 3u(t - 4). \]

(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

\[ g(t) = \frac{dx(t)}{dt} * h(t). \]

(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: