Tutorial 3

(1) Is the system defined by an input-output relation $y(n) = x^2(n-2)$ LTI ?

(2) For each of the following, state whether the system is : (i) stable, (ii) causal, (iii) linear (iv) Time invariant, (v) Memoryless

a) $y(n) = -a\,x(n) + b, \quad a, b \in R$

b) $y(n) = e^{x(n)}$

c) $y(n) = \sum_{k=n_0}^{n} x(k)$

(3) Determine if the following represent time invariant (TI) or time-varying (TV) system.

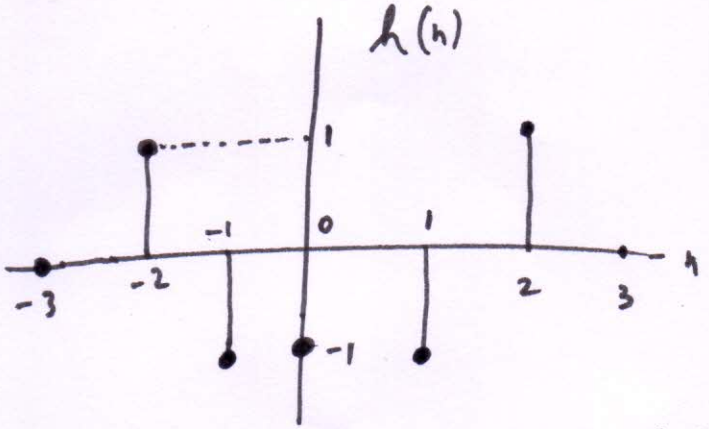
a) $y(t) = 3\,x^2(t)\,u(t)$

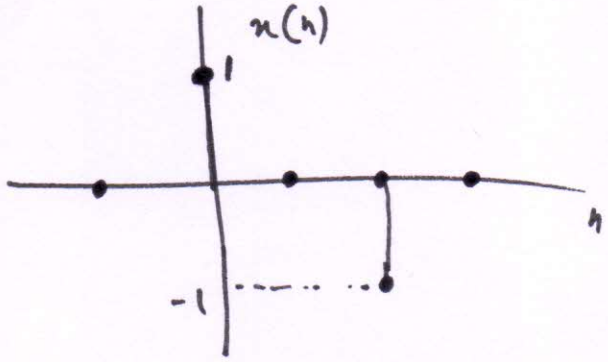
b) $y(t) = \int_0^t e^{-2\tau} x(\tau)\, d\tau$

(4) Let $y(n) = 2\,x(n) - x(n-3)$. Is this an LTI system ?

(5) Let $h(n) = 2^n u(n+1)$. Discuss causality and stability of such a system.

(6) $x(n)$ and $h(n)$ are shown below.





Assume that $x(n)$ and $h(n)$ are zero beyond the shown values.

a) Is the system characterized by $h(n)$ causal or non-causal?

b) Is the system stable?

c) Determine the output $y(n)$ for $x(n)$.