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ASSIGNMENT 1

NMTJ25703

SIGNAL AND SYSTEMS

1. For $h(t) = \cos(\pi t)$ impulse response. Determine whether the corresponding system is:

(i) Memoryless

- The system is memoryless because the output depends only on the input samples at the same instant.
- It does not depend on past or future values of the input.

(ii) Causal

- The system is causal because the output of the system depends only on the present input sample.
- It does not depend on future values.
- A system is said to be causal if the present value of output signal depends only on the present or the past values of input signal.
- Thus, the system above is causal.

(iii) Stable

$$\begin{aligned} \max |h(t)| &< \infty \\ \max |y(t)| &< \infty \end{aligned}$$

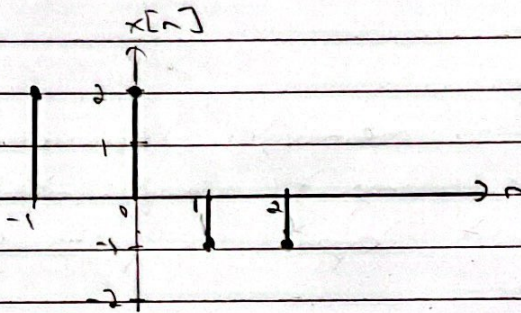
 $x(t)$ $y(t) = \cos(\pi t)$

- The system is stable because it produces every bounded input in that system produces a bounded output.
- The bounded signal has an amplitude that remains finite.
- It is also known as BIBO (Bounded input and bounded output) stable system.

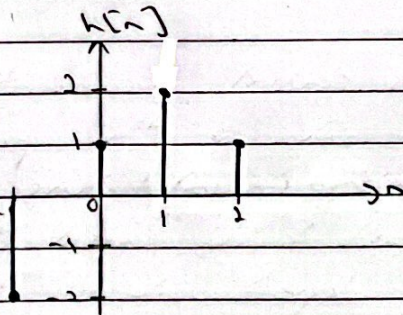
2. Find the convolution $y[n] = x[n] * h[n]$ of the following signals by using graphical method, where $x[n] = \{2, 2, -1, -1\}$, and $h[n] = \{-2, 1, 2, 1\}$.

Draw $x[n]$, $h[n]$ and the output signal $y[n]$.

(1) $x[n]$



(2) $h[n]$



(3) $y[n] = x[n] * h[n]$

$$= \{2, 2, -1, -1\} * \{-2, 1, 2, 1\}$$

$$= \{-4, 2, -2, -1\}$$

2	2	-1	-1
-2	1	2	1
-4	2	-2	-1

