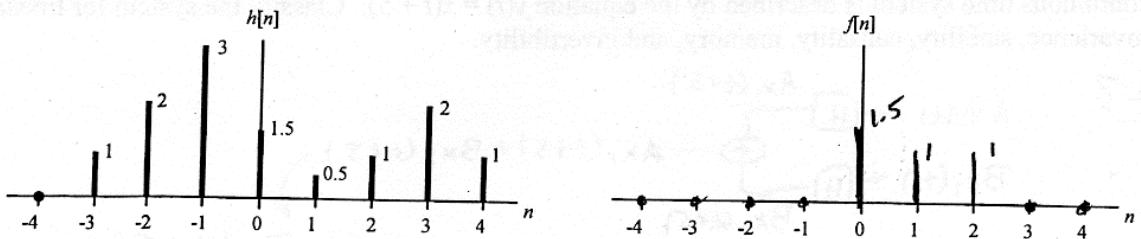


1. In the plot below, $h[n]$ is zero at all n except those shown. Sketch $f[n] = h[2n] \cdot \text{rect}_2[n - 2]$.



$$n \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4$$

$$2n \quad -8 \quad -6 \quad -4 \quad -2 \quad 0 \quad 2 \quad 4 \quad 6 \quad 8$$

$$h[2n] \quad 0 \quad 0 \quad 0 \quad 2 \quad 1.5 \quad 1 \quad 1 \quad 0 \quad 0$$

$$\text{rect}_2[n-2] \quad 0 \quad 0 \quad 0 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1$$

$$f[n] \quad 0 \quad 0 \quad 0 \quad 0 \quad 1.5 \quad 1 \quad 1 \quad 0 \quad 0$$

2. Given: $x[n] = \cos(2\pi n) - \cos(5\pi n/2)$. Determine the period of $x[n]$.

$$x[n] = \cos(2\pi n) - \cos(2\pi \frac{5}{4}n)$$

$$\text{LCM}(1, 4) = \boxed{4 = N_0}$$

3. Determine the energy E_x in one period of $x[n]$ from problem 2.

$$n=0 \quad x[0] = 1 - 1 = 0$$

$$n=1 \quad x[1] = 1 - 0 = 1$$

$$n=2 \quad x[2] = 1 - (-1) = 2$$

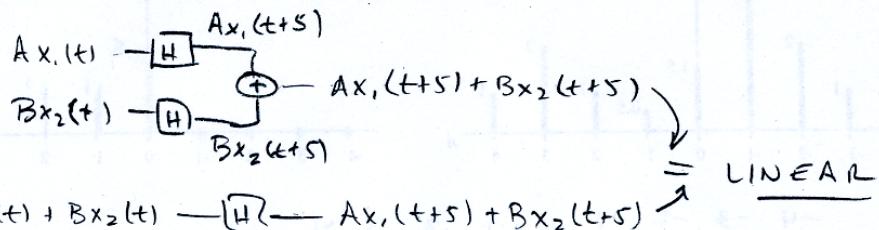
$$n=3 \quad x[3] = 1 - 0 = 1$$

$$E_x = \sum_{n=0}^3 |x[n]|^2 = 0 + 1^2 + 2^2 + 1^2 = \underline{\underline{6}}$$

EE322 Quiz Fall 2012 (page 2)

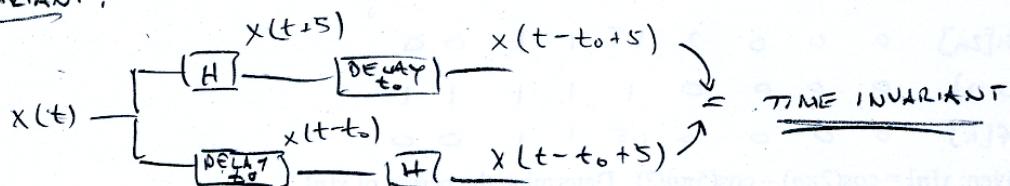
4. A continuous time system is described by the equation $y(t) = x(t+5)$. Classify the system for linearity, time invariance, stability, causality, memory, and invertibility.

LINEAR?



LINEAR

TIME INVARIANT?



TIME INVARIANT

STABILITY?

IF $|x| < M < \infty$, THEN $|x(t+5)| < M < \infty \Rightarrow$ BIBO STABLE
ONLY A TIME SHIFT

CAUSAL?

$$\begin{aligned} x(t) &\rightarrow [H] \rightarrow y(t) \\ x(0) &\rightarrow [H] \rightarrow y(0) = x(5) \quad \text{OUTPUT DEPENDS ON FUTURE VALUE} \Rightarrow \text{NON-CAUSAL} \end{aligned}$$

MEMORY? ALL t , OUTPUT DEPENDS ON $x(t+5)$, DIFF. TIME THAN CURRENT TIME

DYNAMIC, MEMORY

INVERTIBILITY?

$$\begin{aligned} x(t) &\rightarrow [H] \rightarrow y(t) \rightarrow [H] \rightarrow z(t) \\ &= x(t+5) \quad = y(t-5) = x(t) \Rightarrow \text{INVERTIBLE} \end{aligned}$$

5. Solve $10\log(0.02) - 10\log(200) = \underline{-40}$

$$\frac{0.02}{200} = .0001 \quad \log(0.0001) = -4$$

Bonus: Four US Presidents have been assassinated: Name three of them.

LINCOLN, GARFIELD, MCKINLEY, KENNEDY