Name Answers

EE3032 – Dr. Durant – Quiz 2
Fall 2017, Week 2

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1. (3 points) x(t) = sin(4πt). Write an equation for y(t) which is x(t) folded about the y-axis (reflected in time) and then left shifted (advanced) by 1 second.
2. (3 points) x(t) = sin(4πt). Write an equation for z(t) which is x(t) multiplied by u(t), then scaled up by 4, and then delayed by 1 second, before being integrated. (Let the value of the integral be 0 at t=0.)
3. 3 (3 points) Draw a block diagram representing the system described immediately above.
4. (1 point) Explain whether z(t) is a finite energy signal.
5. (1 point) Left shift has -4π (ϕ of 2cyc@2Hz = 1s) or $(t+1)$. Left + Right by 1s is same in this case since $\omega = 4\pi \rightarrow f = 2 \rightarrow T = \frac{1}{2}$ ∴ moving 2 periods after fold, only fold affects. Either answer ok. (1 point) Explain whether z(t) is a finite power signal.

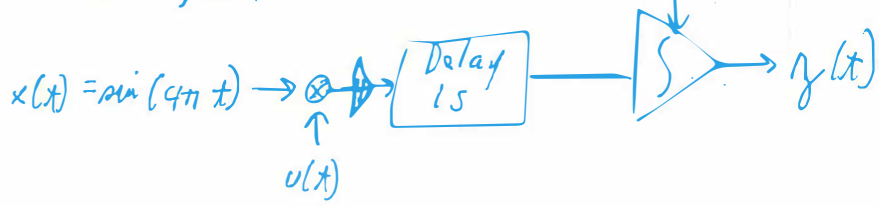
(1) $y(t) = \sin(-4\pi t + 4\pi)$ (right) $= \sin(-4\pi(t-1))$ (right) $= -\sin(4\pi(t-1))$

(2) $z(t) = \int_{0}^{t} 4\, x(t-1)\, u(t-1)\, dt$

$x(t-1) = \sin(4\pi(t-1))$

0 ↑ or $-\infty$, or 1

(3)



(4) infinite energy. Signal persists forever & doesn't decay

(5) finite power. There is a fixed energy per period ...

$E_{PER} = \int_{0}^{1/2} \sin^2(4\pi t)\, dt = \frac{1}{4} = \left(\frac{1}{2} \cdot \frac{1}{2}\right)$

0 ↑ any full period

$\sin^2(4\pi t)$ ↑ equal amounts & values > 1/2 & < 1/2

$\frac{1}{2}$ ↑ effective height, width

Can get same result w/ trig. sub.

$P = \frac{E_{PER}}{t} = \frac{1/4}{1/2} = \frac{1}{2}$ W ∴ finite