



# ISRA UNIVERSITY

Islamabad Campus

Program: MSc & BSc (Electrical)  
Semester - Fall 2018

Signal & Systems

SOLUTIONS

Quiz - 1  
Marks: 10

Handout Date: 01/11/2018

Question # 1:

Determine whether or not the following signal is periodic. If a signal is periodic, specify its fundamental period:

$$x(t) = 2 \cos(10t + 1) - \sin(4t - 1)$$

Sol

$$x_1(t) = 2 \cos(10t + 1), \quad x_2(t) = \sin(4t - 1)$$

$$\omega_1 = 10, \quad \omega_2 = 4$$

Step #1  $T_1 = \frac{2\pi}{\omega_1} = \frac{2\pi}{10} \Rightarrow \pi/5, \quad T_2 = \frac{2\pi}{\omega_2} = \frac{2\pi}{4} \Rightarrow \pi/2$

Step #2  $\frac{T_1}{T_2} = \frac{\pi/5}{\pi/2} = \frac{\pi}{5\pi} \times 2 \Rightarrow \frac{2}{5}$  rational.

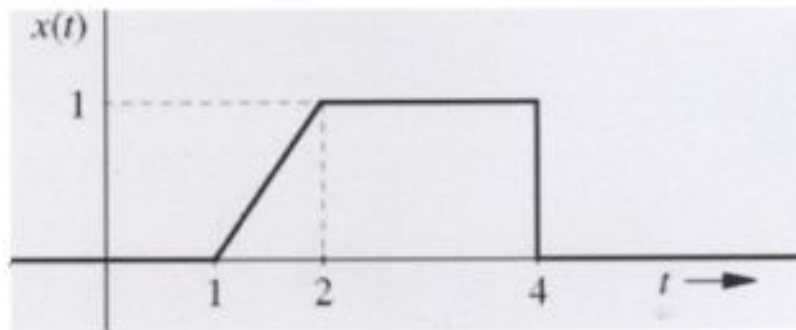
Hence,  $x(t)$  is periodic.

Step #3  $T_0 = \text{LCM}(T_1, T_2)$   
 $= \text{LCM}\left(\frac{\pi}{5}, \frac{\pi}{2}\right) = \frac{\text{LCM of Numerator}}{\text{HCF of Denominator}}$   
 $= \frac{\pi}{1} \Rightarrow \pi$

Fundamental Period,  $T_0 = \pi$

**Question # 2:**

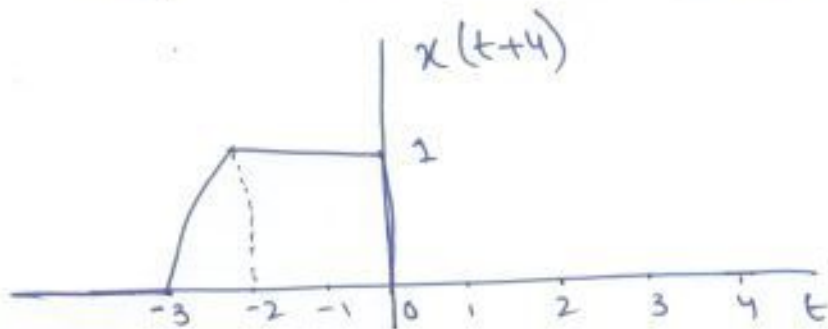
Sketch the following signals:



1. Sketch  $y(t) = x(-t + 4)$

Solve

Shift  $x(t)$  4 points towards the ~~right~~ left



Now flip the signal over the x-axis

