

In the Name of God, the Compassionate, the Merciful

**Signals and Systems – CE Department – Sharif University of Technology
Fall 2007 – Sample Questions**

- 1) Let $x(t)$ be a periodic signal with period T , another signal $y(t)$ is made from $x(t)$ in this way

$$y(t) = \begin{cases} x(t) & 0 < t < T \\ 0 & T < t < 2T \end{cases}$$

And $y(t)$ is periodic with period $2T$. Find fourier series expansion of $y(t)$ in terms of fourier series coefficients of $x(t)$.

- 2) Consider a discrete-time signal $x[n]$. We have the following information in the time domain about the signal :

$$x[n] = \begin{cases} 1 & n = 0 \\ 0 & n = 3k, k \neq 0 \end{cases}$$

What can be said about fourier transform of $x[n]$?

- 3) Find the fourier series expansion of the following signal

$$x[n] = (-1)^n \sin\left(\frac{6\pi n}{7} + 1\right) \cos\left(\frac{4\pi n}{3}\right)$$

- 4) Problem 2.48 of the book
5) Find the impulse response of inverse of the following system

$$y[n] - 2y[n-1] + y[n-2] = 2x[n] - x[n-1]$$

Verify the following properties:

- Casual
- Stable