

ENEE 222: 4/18 Class

Material: Lecture videos 18.1, 18.2, 18.3

1. The sum of three continuous-time sinusoids of frequencies

18, 24 and 96 Hz

is periodic with fundamental frequency

- A. 2 Hz B. 3 Hz C. 6 Hz D. 18 Hz

2. The sum of two continuous-time sinusoids of frequencies

2 and $\sqrt{2}$ Hz

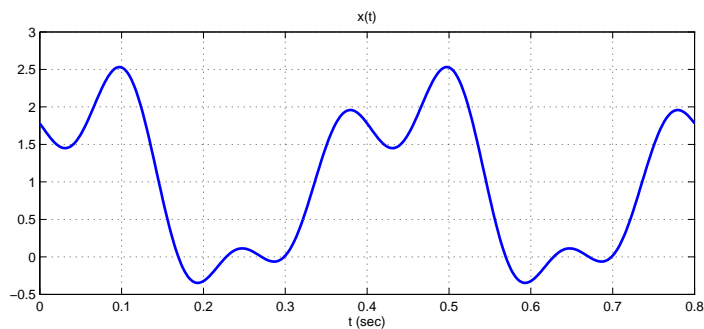
is

- A. periodic with fundamental frequency $\sqrt{2}$ Hz
B. periodic with fundamental frequency $2 - \sqrt{2}$ Hz
C. periodic with fundamental frequency $2 + \sqrt{2}$ Hz
D. not periodic

3. The graph below depicts two periods of the finite real-valued Fourier series

$$x(t) = \sum_{k=0}^M A_k \cos(k\Omega_0 t + \phi_k) ,$$

where all A_k 's are nonzero.



The value of Ω_0 , in rad/sec, equals

- A. 0.4π B. 0.8π C. 2.5π D. 5π

4. If $x(t)$ is as question 3 above, then

- A. $M = 0$
B. $M = 1$
C. $M \geq 2$
D. There is insufficient information to determine which (if any) of A–C is true.

5. (HW 22 ~ii) Let

$$s(t) = -5.7 + 2.6 \cos(36\pi t + 0.3) + 8.2 \cos(48\pi t - 2.5) + 3.8 \cos(192\pi t + 1.7),$$

where t is in seconds. Sketch the complex Fourier series spectrum of $s(t)$, with frequency Ω on the horizontal axis. Mark each spectral line (stem) with the corresponding complex coefficient value.

6. (HW 22 ~iii) Suppose that $s(t)$ is sampled every $T_s = T_0/N$ seconds, where N is an integer, to produce

$$s[n] = s(nT_s)$$

Write an equation for $s[n]$ in terms of real sinusoids.

7. (HW 22 ~iv) Use the IFFT function in MATLAB to generate 512 samples of $s(t)$ over its first period $[0, T_0]$.