

EECS20n, Quiz 4, 3/19/03

Please print your name and lab time here:

Last Name _____ First _____ Lab time _____

1. The signal $s : \mathbb{R} \rightarrow \mathbb{R}$ is given by

$$\forall t \in \mathbb{R}, \quad s(t) = 2 + \sin 2\pi t + \sin 3\pi t.$$

- (a) What is the period of s in seconds (assume t is in seconds)?
- (b) Write down the Fourier series expansion of s in the form

$$\forall t, \quad s(t) = A_0 + \sum_{k=1}^{\infty} A_k \cos(2\pi k f_0 t + \phi_k),$$

i.e. identify f_0 and the coefficients, A_0, A_k, ϕ_k .

- (c) In the following x is a discrete-time signal $x : \mathbb{Z} \rightarrow \mathbb{R}$. For each case determine whether x is periodic and if it is periodic find its period (in samples).
- i.

$$\forall n, \quad x(n) = 1 + \cos(2\pi \times 5n).$$

ii.

$$\forall n, \quad x(n) = \sin\left(2\pi \times \frac{5}{7}n\right).$$