

EE 341 - Homework 9

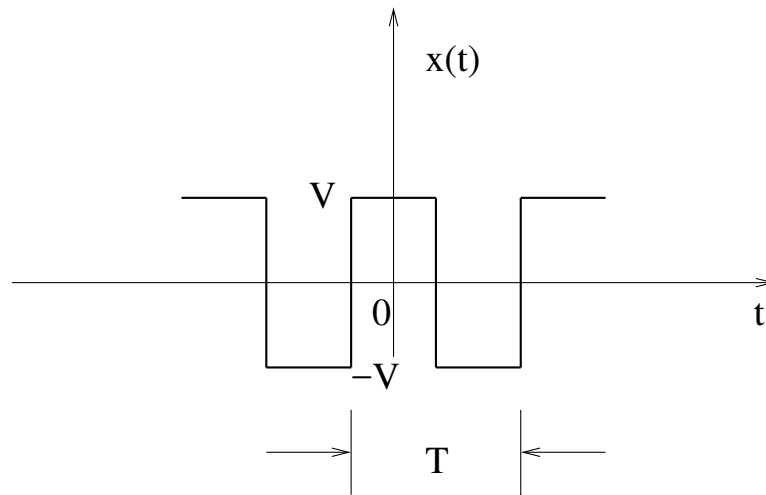
Nov. 5, 2018

1. A system is characterized by the differential equation

$$c_1 \frac{d^2}{dt^2} y + c_2 \frac{dy}{dt} + c_3 y = A \cos(\omega t + \phi)$$

determine $y(t)$ for the following: $c_1 = 5 \times 10^{-6}$, $c_2 = 1$, $c_3 = 10^6$, $A = 4$, $\omega = 10^6$ rad/s, and $\phi = -60$ degrees.

2. Find the Fourier Series coefficients for the periodic signal shown in the figure below

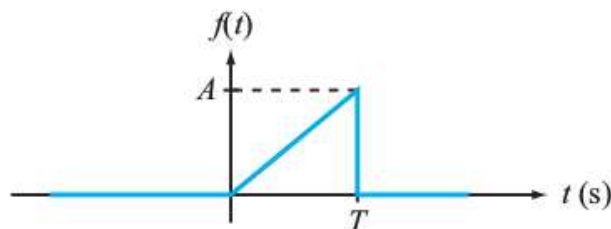


3. Consider the continuous-time LTI system with the frequency response

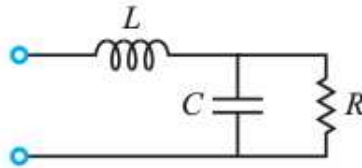
$$H(\omega) = \frac{a - j\omega}{a + j\omega}$$

where $a > 0$.

- (a) What is the magnitude of $H(\omega)$?
(b) What is the angle $\angle(H(\omega))$?
4. Determine the Fourier Transform of the waveform in the figure below



5. Determine the resonant frequency of the circuit shown in the figure below, given that $R = 100 \Omega$, $L = 5 \text{ mH}$, and $C = 1 \mu\text{F}$.



6. For the op-amp circuit of the figure below provide the following:

- (a) $H(\omega) = \frac{V_o}{V_s}$
(b) What type of filter is it? What is its maximum gain?

