

Spring 2019 - Quiz 5

ECE 301: Signals and Systems

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Total points: 30 + 6 (bonus points)

Problem 1 [12 points]

For the signal, $x(t) = \frac{\sin(t/4)\sin(t/2)}{\pi t^2}$, find the Fourier Transform $X(j\omega)$.

Problem 2 [12 points]

Consider a system described by the following differential equation:

$$\frac{dy(t)}{dt} + ay(t) = x(t).$$

Find the frequency response $H(j\omega)$. and the impulse response $h(t)$. Comment on the functionality of the system.

Problem 3 [12 points]

Consider a signal $x(t)$, with Fourier transform $X(j\omega)$ given in figure 1. The signal $x(t)\cos^2(\omega_c t)$ is input to a system with impulse response $\frac{\sin(\omega_M t)}{\pi t}$. ($\omega_c \gg 2\omega_M$). What is the output signal of the system?

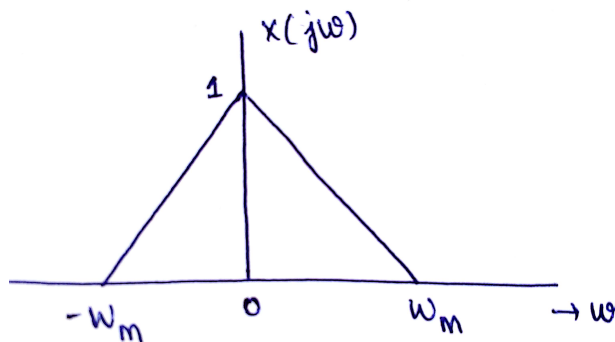


Figure 1: $X(j\omega)$