

## **PROBLEM:**

The frequency response of an ideal lowpass LTI system is

$$H(j\omega) = \begin{cases} 10e^{-j\omega 0.001} & |\omega| < 200\pi \\ 0 & |\omega| > 200\pi. \end{cases}$$

In each of the following cases, determine the Fourier transform of the input signal and then use frequencydomain methods to determine the corresponding output signal.

(a) Using frequency-domain methods, determine  $y_a(t)$ , the output of the system when the input is

$$x_a(t) = \cos(100\pi t) + \frac{2\sin(400\pi t)}{\pi t}.$$

(b) Determine the output  $y_b(t)$  if the input is

$$x_b(t) = \cos(100\pi t) + \frac{2\sin(400\pi t)}{\pi t} + \sin(300\pi t).$$

(c) Determine the output  $y_c(t)$  if the input is

$$x_c(t) = \cos(100\pi t) + 2\delta(t).$$

(d) What is it about this system that accounts for the results you obtained above?

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