ECE-220 Problem 21 (Old exam questions)
Consider the continuous-time LTI system that has the impulse response $h(t)$ shown in Figure 21.1 and the frequency response $H(j\omega)$ shown in Figure 21.2.

![Figure 21.1: Impulse response $h(t)$ of the CT LTI system in Problem 3](image1)

![Figure 21.2: Frequency response (magnitude and phase plots) of the CT LTI system in Problem 3](image2)

In parts a-d below, you are given 4 signals that are inputs to the LTI system defined above: Determine and sketch the output of the system corresponding to each input. Make sure to label your sketches!

(a) Input to system: $x_a(t) = \delta(t)$. Determine the output $y_a(t)$. Provide a sketch of $y_a(t)$ and justification of your answer.

(b) Input to system: $x_b(t) = \cos(2\pi t)$. Determine the output $y_b(t)$. Provide a sketch of $y_b(t)$ and justification of your answer.

(c) Input to system: $x_c(t) = p(t) \cos(100\pi t)$, where $p(t)$ and its Fourier transform $P(j\omega)$ are shown in Figure 21.3. Determine the output $y_c(t)$. Provide a sketch of $y_c(t)$ and justification of your answer.

(d) Input to system: $x_d(t)$ shown in Figure 21.4. Determine the output $y_d(t)$. Provide a sketch of $y_d(t)$ and justification of your answer.
Figure 21.3: Signal $p(t)$ and its Fourier transform $P(j\omega)$.

Figure 21.4: Input signal $x_d(t)$ for Problem 3d