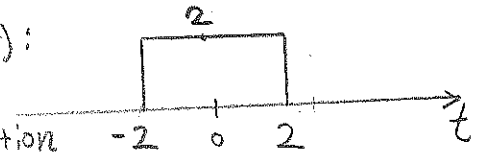
EE 3054 · Quiz 12
SPRING 2012

① $y'(t) + A\,y(t) = B\,x'(t) + C\,x(t)$ is the diff eq. of a real causal LTI system.

Find A, B, C so that
- the system blocks dc
- the time constant of the system is 2 seconds
- the systems preserves the amplitude of the input signal $x(t) = \cos(t)$

② Find the Fourier transform of $x(t) = \sin(t) \cdot \sin(2t)$

③ Find the FT of $x(t)$:
Express your answer in terms of the sinc function

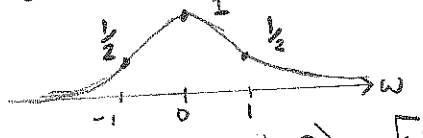


$$x(t) = \begin{cases} 2, & |t| \le 2 \\ 0, & |t| > 2 \end{cases}$$

④ Find the FT of $x(t) = \delta(t) - 2\delta(t-1)$

⑤ The Fourier Transform of $x(t)$ is known to be:

$$X^f(\omega) = \frac{1}{\omega^2 + 1}$$



a) The signal $g(t)$ is defined as $g(t) = x(t-2)$. Find $G^f(\omega)$. sketch $|G^f(\omega)|$

b) The " $h(t)$ " " " $h(t) = x(2t)$. Find $H^f(\omega)$. sketch $|H^f(\omega)|$

c) The " $r(t)$ " " " $r(t) = x(t) * x(t)$, Find $R^f(\omega)$. sketch $|R^f(\omega)|$

d) " " $v(t)$ " " $v(t) = x(t) \cdot e^{jt}$, Find $V^f(\omega)$. sketch $|V^f(\omega)|$

⑥ Find the Fourier Transform of $x(t) = e^{-2t}\,u(t)$.