ECE 3337: Signals & Systems Analysis, Class Worksheet 22

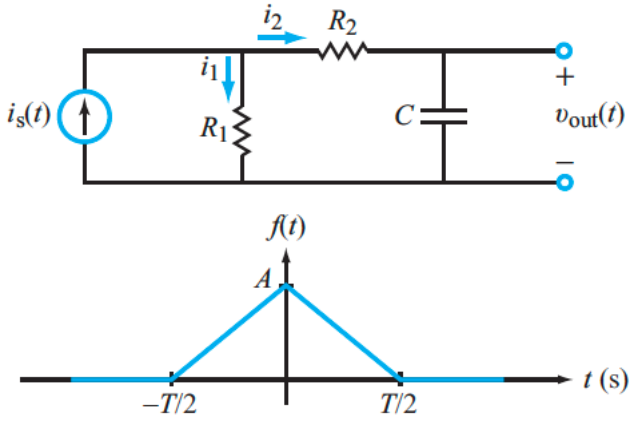
1. (30 pts) Given that the Fourier transform of the signal $x(t)$ is $\mathbf{X}(\omega) = \frac{5}{2+j\omega}$, calculate the Fourier transforms of the following signals:

a. (10 pts) $x(3t-2)$
b. (10 pts) $tx(t)$
c. (10 pts) $\frac{dx(t)}{dt}$

2. (20 points) Given that the Fourier transform of the signal $x(t)$ is $\mathbf{X}(\omega) = \frac{e^{-j\omega}}{2+j\omega} + 1$, calculate the Fourier transforms of the following signals:

a. $(10\ pts)x(\frac{5}{8}t)$
b. $(10\ pts)x(t)\cos(2t)$

3. (50 pts) Consider the following circuit, and the input waveform $i_S(t) = f(t)$:



a. (25 pts) Derive an expression for $I_S(\omega)$ using Fourier analysis
b. (25 pts) Calculate $V_{out}(\omega)$ for this circuit.