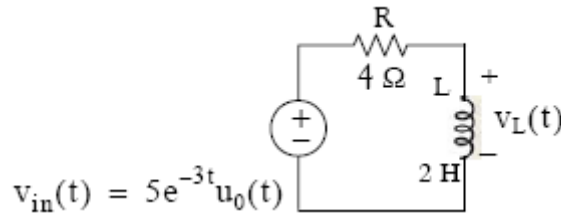


EE224 SEMESTER EXAM

Q1.a) (10pt) What is the difference between the trigonometric Fourier series expansion and the exponential Fourier series expansion?

Q1.b) (20pt) For the circuit in given below, use the Fourier transform method and compute $v_L(t)$. Assume that $i_L(0^-)=0$.



Q2. (20pt) A sinusoidal voltage $E \sin \omega t$, where t is time, is passed through a half wave rectifier that clips the negative portion of the wave. Find the trigonometric Fourier coefficient of this periodic function $u(t)$.

$$u(t) = \begin{cases} 0 & , \quad \text{if } -T < t < 0 \\ E \sin \omega t, & \text{if } 0 < t < T \end{cases} \quad \text{where } T = \frac{\pi}{\omega}$$

Q3. (20pt) A discrete time signal $x[n]$ has discrete time Fourier transform (DTFT)

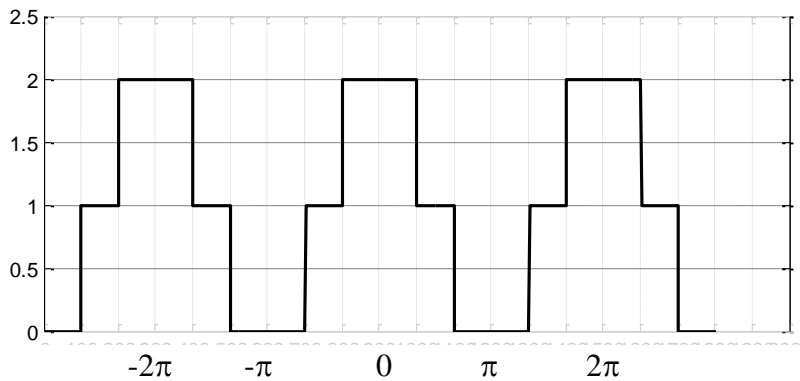
$$X(e^{j\omega}) = \frac{1}{e^{j\omega} + 6}$$

Determine the DTFT of the following time domain sequences:

a) $v[n] = x[n - 5]$

b) $v[n] = x[n] \cos 3n$

Q4. (20pt) Calculate the inverse DTFT of the following $X(e^{j\omega})$ shown below.



Q5. (10pt) What is filter? Why they are used? What are the differences between discrete time and continuous time filter?