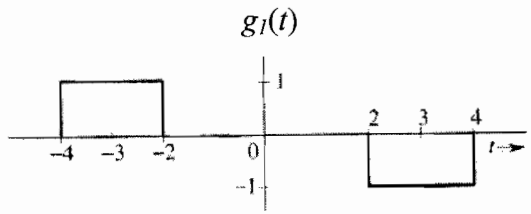


Name: KEY

Sec. 3

Find the Fourier transform of the following signals using the appropriate properties of the Fourier transform and the given tables (Explain all your steps, mention the used property or pair #)



② $g_1(t) = \text{rect}\left(\frac{t+3}{2}\right) - \text{rect}\left(\frac{t-3}{2}\right)$

① Using pair 17

$$\text{rect}\left(\frac{t}{\tau}\right) \Leftrightarrow \tau \text{sinc}\left(\frac{\omega\tau}{2}\right)$$

$$\Rightarrow \text{rect}\left(\frac{t}{2}\right) \Leftrightarrow 2 \text{sinc}(\omega)$$

① & the time shifting property

$$g(t-t_0) \Leftrightarrow G(\omega) e^{-j\omega t_0}$$

\Rightarrow

$$G_1(\omega) = 2 \text{sinc}(\omega) e^{j\omega 3} - 2 \text{sinc}(\omega) e^{-j\omega 3}$$

$$= 2 \text{sinc}(\omega) (e^{j\omega 3} - e^{-j\omega 3})$$

②

In addition to superposition (linearity of F.T)

$$g_2(t) = 1/(\pi t)$$

hint: you might need to use the symmetry (duality) property

① Using pair #12

$$\text{sgn}t \Leftrightarrow \frac{2}{j\omega}$$

Using duality "Symmetry"

① $\frac{2}{j\omega} \Leftrightarrow 2\pi \text{sgn}(-\omega)$

multiply by j both sides.

$$\frac{2}{\omega} \Leftrightarrow 2\pi j \text{sgn}(-\omega)$$

divide by 2π both sides

② $\frac{1}{\pi t} \Leftrightarrow +j \text{sgn}(-\omega)$