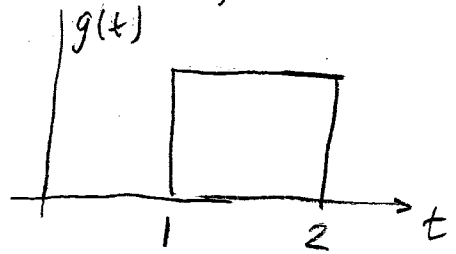


① Using the definition, find the Fourier transform of:

Key



$$G(\omega) = \int_1^2 e^{-j\omega t} dt$$

$$= -\frac{1}{j\omega} e^{-j\omega t} \Big|_1^2$$

$$= -\frac{1}{j\omega} (e^{-j2\omega} - e^{-j\omega})$$

$$= -\frac{1}{j\omega} (e^{-j\omega/2} - e^{j\omega/2}) e^{-j\omega \cdot 1.5}$$

$$= +\frac{2}{\omega} \frac{1}{2j} (e^{j\omega/2} - e^{-j\omega/2}) e^{-j\omega \cdot 1.5}$$

$$= +\frac{2 \sin(\omega/2)}{\omega} e^{-j\omega \cdot 1.5} = +\text{sinc}\left(\frac{\omega}{2}\right) e^{-j\omega \cdot 1.5}$$

- 0 = correct
- 1 = math error or incomplete math
- 2 = small concept error
- 3 = med. concept error
- 4 = bigger concept error
- 5 = lost

$$\sin x = \frac{1}{2j} (e^{jx} - e^{-jx})$$

② Repeat using the tables and appropriate properties.

From table:

$$\text{rect}\left(\frac{t}{T}\right) \Leftrightarrow T \text{sinc}\left(\frac{\omega T}{2}\right) \quad T=1$$

$$g(t) = \text{rect}(t-1.5)$$

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

$$t_0 = 1.5$$

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

$$\text{So } \text{rect}(t-1.5) \Leftrightarrow \text{sinc}\left(\frac{\omega}{2}\right) e^{-j\omega \cdot 1.5}$$

- 0 = correct
- 1 = math error
- 2 = small concept error
- 3 = med concept error