

Problem 2.27

The $G(f)$ is in the form of a unit step function defined in the frequency domain, as shown in Fig. 1

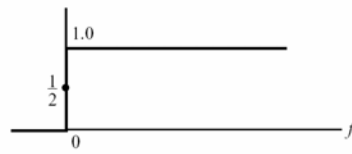


Figure 1

Now, for a unit step function defined in the time domain, we have

$$u(t) \Leftrightarrow \frac{1}{j2\pi f} + \frac{1}{2}\delta(f)$$

Applying the duality property of the Fourier transform to this relation, we get

$$-\frac{1}{j2\pi t} + \frac{1}{2}\delta(f) \Leftrightarrow u(f)$$

where we have used the fact that $\delta(-t) = \delta(t)$. Therefore, the time function $g(t)$ whose Fourier transform is depicted in Fig. 1, is given by

$$g(t) = -\frac{1}{j2\pi t} + \frac{1}{2}\delta(t)$$