

EXERCISE 11.7: The Fourier transform integral for w(t) in Example 11-6 is

$$W(j\omega) = \int_{-\infty}^{0} e^{bt} e^{-j\omega t} dt$$

Evaluate this integral and show that the result is the same as was obtained in Example 11-6.

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$$\begin{split} W(j\omega) &= \int_{-\infty}^{0} e^{bt} e^{-j\omega t} dt \\ &= \int_{-\infty}^{0} e^{(b-j\omega)t} dt \\ &= \frac{e^{(b-j\omega)t}}{b-j\omega} = \frac{1 - \lim_{t \to -\infty} e^{bt} e^{-j\omega t}}{b-j\omega} = \frac{1}{b-j\omega} \end{split}$$

Since $b > 0$, $\lim_{t \to -\infty} e^{bt} e^{-j\omega t} = 0$
because $|e^{bt} e^{-j\omega t}| = |e^{bt}||e^{-j\omega t}| = |e^{bt}|.$

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