

**13.2** Find the Laplace transform of the function

$$f(t) = te^{-at} \sin(\omega t) \delta(t - 4).$$

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SOLUTION:

$$\begin{aligned} \mathcal{L}[f(t)] &= \int_0^{\infty} te^{-at} e^{-st} \sin(\omega t) \delta(t-4) dt \\ &= te^{-(s+a)t} \sin(\omega t) \Big|_{t=4} \end{aligned}$$

$$\boxed{\mathcal{L}[f(t)] = 4e^{-4(s+a)} \sin(4\omega)}$$