

## Problem 1

In each of Problems 1 through 10, find the inverse Laplace transform of the given function.

$$F(s) = \frac{3}{s^2 + 4}$$

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### Solution

Recall that one of the known Laplace transforms is

$$\mathcal{L}\{\sin at\} = \frac{a}{s^2 + a^2}.$$

Write  $F(s)$  in terms of this.

$$F(s) = \frac{3}{2} \frac{2}{s^2 + 4}$$

Take the inverse Laplace transform of both sides.

$$\begin{aligned}\mathcal{L}^{-1}\{F(s)\} &= \mathcal{L}^{-1}\left\{\frac{3}{2} \frac{2}{s^2 + 4}\right\} \\ f(t) &= \frac{3}{2} \mathcal{L}^{-1}\left\{\frac{2}{s^2 + 4}\right\} \\ &= \frac{3}{2} \sin 2t\end{aligned}$$