

Problem 6

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

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

Solution

Factor the denominator.

$$\begin{aligned} F(s) &= \frac{2s - 3}{(s + 2)(s - 2)} \\ &= \frac{7/4}{s + 2} + \frac{1/4}{s - 2} \end{aligned}$$

Take the inverse Laplace transform to get $f(t)$.

$$\begin{aligned} \mathcal{L}^{-1}\{F(s)\} &= \mathcal{L}^{-1}\left\{\frac{7/4}{s + 2} + \frac{1/4}{s - 2}\right\} \\ f(t) &= \frac{7}{4}\mathcal{L}^{-1}\left\{\frac{1}{s + 2}\right\} + \frac{1}{4}\mathcal{L}^{-1}\left\{\frac{1}{s - 2}\right\} \\ &= \frac{7}{4}e^{-2t} + \frac{1}{4}e^{2t} \end{aligned}$$