Problem 22

In each of Problems 19 through 24, find the inverse Laplace transform of the given function.

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

Solution

Apply the two transforms,

$$\mathcal{L}\{\sinh at\} = \frac{a}{s^2 - a^2} \quad \text{and} \quad \mathcal{L}\{f(t-c)H(t-c)\} = F(s)e^{-cs},$$

together to solve this problem.

$$
\begin{aligned}
f(t) &= \mathcal{L}^{-1}\{F(s)\} \\
&= \mathcal{L}^{-1}\left\{\frac{2}{s^2-4}e^{-2s}\right\} \\
&= \sinh[2(t-2)]H(t-2) \\
&= \sinh[2(t-2)]u_2(t)
\end{aligned}
$$