

Problem 19

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

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

Solution

Apply the two transforms,

$$\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}} \quad \text{and} \quad \mathcal{L}\{e^{ct}f(t)\} = F(s-c),$$

together to solve this problem.

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