

Problem 13 in Section 7.1. Compute $\mathcal{L}(f(t))$ for $f(t) = t - 2e^{3t}$.

Solution. We compute

$$\begin{aligned}\mathcal{L}(f(t)) &= \mathcal{L}(t - 2e^{3t}) \\ &= \mathcal{L}(t) - 2\mathcal{L}(e^{3t})\end{aligned}$$

Use the fact sheet about Laplace transforms to see that $\mathcal{L}(t) = \frac{1}{s^2}$ and $\mathcal{L}(e^{at}) = \frac{1}{s-a}$.

$$= \boxed{\frac{1}{s^2} - \frac{2}{s-3}}.$$