

Exercise 22

Differentiate.

$$V(t) = \frac{4+t}{te^t}$$

SolutionUse the quotient rule and the product rule to differentiate $V(t)$.

$$\begin{aligned} V'(t) &= \frac{d}{dt} \left(\frac{4+t}{te^t} \right) \\ &= \frac{\left[\frac{d}{dt}(4+t) \right] (te^t) - \left[\frac{d}{dt}(te^t) \right] (4+t)}{(te^t)^2} \\ &= \frac{(1)(te^t) - \left\{ \left[\frac{d}{dt}(t) \right] e^t + t \left[\frac{d}{dt}(e^t) \right] \right\} (4+t)}{t^2 e^{2t}} \\ &= \frac{te^t - [(1)e^t + t(e^t)] (4+t)}{t^2 e^{2t}} \\ &= \frac{-4e^t - 4te^t - t^2 e^t}{t^2 e^{2t}} \\ &= -\frac{4 + 4t + t^2}{t^2 e^t} \\ &= -\frac{(2+t)^2}{t^2 e^t} \end{aligned}$$