

Exercise 18

Differentiate.

$$h(r) = \frac{ae^r}{b + e^r}$$

SolutionUse the quotient rule to differentiate $h(r)$.

$$\begin{aligned} h'(r) &= \frac{d}{dr} \left(\frac{ae^r}{b + e^r} \right) \\ &= \frac{\left[\frac{d}{dr}(ae^r) \right] (b + e^r) - \left[\frac{d}{dr}(b + e^r) \right] (ae^r)}{(b + e^r)^2} \\ &= \frac{(ae^r)(b + e^r) - (e^r)(ae^r)}{(b + e^r)^2} \\ &= \frac{abe^r + ae^{2r} - ae^{2r}}{(b + e^r)^2} \\ &= \frac{abe^r}{(b + e^r)^2} \end{aligned}$$