

Exercise 19

Differentiate.

$$y = \frac{s - \sqrt{s}}{s^2}$$

SolutionUse the quotient rule to differentiate y .

$$\begin{aligned} y' &= \frac{d}{ds} \left(\frac{s - s^{1/2}}{s^2} \right) \\ &= \frac{\left[\frac{d}{ds}(s - s^{1/2}) \right] (s^2) - \left[\frac{d}{ds}(s^2) \right] (s - s^{1/2})}{(s^2)^2} \\ &= \frac{\left(1 - \frac{1}{2}s^{-1/2} \right) (s^2) - (2s)(s - s^{1/2})}{s^4} \\ &= \frac{\left(s^2 - \frac{1}{2}s^{3/2} \right) - (2s^2 - 2s^{3/2})}{s^4} \\ &= \frac{-s^2 + \frac{3}{2}s^{3/2}}{s^4} \\ &= -s^{-2} + \frac{3}{2}s^{-5/2} \end{aligned}$$