

**Exercise 20**

Differentiate.

$$y = (z^2 + e^z)\sqrt{z}$$

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**Solution**Use the product rule to differentiate  $y$ .

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