

**Exercise 26**Calculate  $y'$ .

$$y = \sqrt{\sin \sqrt{x}}$$

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**Solution**Calculate  $y'$  by using the chain rule repeatedly.

$$\begin{aligned}y' &= \frac{d}{dx} \sqrt{\sin \sqrt{x}} \\&= \frac{1}{2} (\sin \sqrt{x})^{-1/2} \cdot \frac{d}{dx} (\sin \sqrt{x}) \\&= \frac{1}{2} (\sin \sqrt{x})^{-1/2} \cdot (\cos \sqrt{x}) \cdot \frac{d}{dx} (\sqrt{x}) \\&= \frac{1}{2} (\sin \sqrt{x})^{-1/2} \cdot (\cos \sqrt{x}) \cdot \left(\frac{1}{2}x^{-1/2}\right) \\&= \frac{1}{2\sqrt{\sin \sqrt{x}}} \cdot (\cos \sqrt{x}) \cdot \left(\frac{1}{2\sqrt{x}}\right) \\&= \frac{\cos \sqrt{x}}{4\sqrt{x}\sqrt{\sin \sqrt{x}}} \\&= \frac{\cos \sqrt{x}}{4\sqrt{x \sin \sqrt{x}}}\end{aligned}$$