

Exercises 3.9

Solutions to selected problems

$$(22) \quad y = \cos^{-1}\left(\frac{1}{x}\right)$$

$$y' = \frac{-1}{\sqrt{1 - \left(\frac{1}{x}\right)^2}} \cdot \left(-\frac{1}{x^2}\right)$$

$$(24) \quad y = \sin^{-1}(1-t)$$

$$y' = \frac{1}{\sqrt{1 - (1-t)^2}} (-1)$$

$$(26) \quad y = \sec^{-1}(5s)$$

$$y' = \frac{1}{|5s| \sqrt{(5s)^2 - 1}} \cdot (5)$$

$$(28) \quad y = \csc^{-1} \frac{x}{2}$$

$$y' = \frac{-1}{\left|\frac{x}{2}\right| \sqrt{\left(\frac{x}{2}\right)^2 - 1}} \cdot \left(\frac{1}{2}\right)$$

$$(30) \quad y = \sin^{-1}\left(\frac{3}{t^2}\right)$$

$$y' = \frac{1}{\sqrt{1 - \left(\frac{3}{t}\right)^2}} \cdot \left(\frac{3}{t^2}\right)' = \frac{1}{\sqrt{1 - \left(\frac{3}{t}\right)^2}} \cdot (-6t^{-3})$$

$$(32) \quad y = \cot^{-1} \sqrt{t-1}$$

$$y' = \frac{-1}{1 + (\sqrt{t-1})^2} \cdot \frac{1}{2\sqrt{t-1}} \cdot 1$$

$$(34) \quad y = \tan^{-1}(\ln x)$$

$$y' = \frac{1}{1 + (\ln x)^2} \cdot \frac{1}{x}$$

$$(36) \quad y = \cos^{-1}(e^{-t})$$

$$y' = \frac{-1}{\sqrt{(e^{-t})^2 - 1}} (-e^{-t})$$

$$(38) \quad y = \sqrt{s^2 - 1} - \sec^{-1} s$$

$$y' = \frac{1}{2\sqrt{s^2 - 1}} \cdot 2s - \frac{1}{|s|\sqrt{s^2 - 1}}$$

$$(40) \quad y = \cot^{-1} \frac{1}{x} - \tan^{-1} x$$

$$y' = \frac{-1}{1 + (\frac{1}{x})^2} \left(-\frac{1}{x^2}\right) - \frac{1}{1 + x^2}$$

$$(42) \quad y = \ln(x^2 + 4) - x \tan^{-1}\left(\frac{x}{2}\right)$$

$$y' = \frac{1}{x^2 + 4} (2x) - \left[x \frac{1}{1 + (\frac{x}{2})^2} \cdot \left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{x}{2}\right) \cdot 1 \right]$$