

3.10 Derivatives of Inverse Trig Functions (Solutions)

Warm up:

Explain what each of the following means:

(a) $\sin^{-1}(x)$

(b) $(\sin(x))^{-1}$

(c) $\sin(x^{-1})$

(d) $f^{-1}(x)$

(e) $f(x^{-1})$

(f) $(f(x))^{-1}$

Group work:

Problem 1 Find the derivatives of the following functions:

(a) $f(x) = \sec^{-1}(\sqrt{x})$.

(b) $g(x) = \ln(\sin^{-1}(x))$.

(c) $h(x) = \frac{1}{\tan^{-1}(x^2 + 4)}$.

Problem 2 Find the slope of the tangent line to the curve $y = f^{-1}(x)$ at $(4, 7)$ if the slope of the tangent line to the curve $y = f(x)$ at $(7, 4)$ is $\frac{2}{3}$.

Problem 3 Suppose that $f(x)$ is a differentiable function which is one-to-one. Given the table of values below, find the value of $(f^{-1})'(7)$.

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\mathbf{x}	1	7	11
$\mathbf{f(x)}$	7	11	1
$\mathbf{f'(x)}$	61	-17	71

Problem 4 Find the derivative of f^{-1} at the following points without solving for f^{-1} .

(a) $f(x) = x^2 + 1$ (for $x \geq 0$) at the point $(5, 2)$.

(b) $f(x) = x^2 - 2x - 3$ (for $x \leq 1$) at the point $(12, -3)$.