MATH 1420: WORKSHEET FOR SECTION 3.7

DERIVATIVES OF INVERSE FUNCTIONS

Logarithms.

$$\frac{\mathrm{d}}{\mathrm{d}x}\ln x = \frac{1}{x}$$

$$\frac{\mathrm{d}}{\mathrm{d}x}\log_b x = \frac{1}{\ln(b)\cdot x}, \qquad b > 1 \text{ is a constant}$$

Inverse trig functions.

$$\frac{\mathrm{d}}{\mathrm{d}x}\arcsin x = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{\mathrm{d}}{\mathrm{d}x}\arccos x = -\frac{1}{\sqrt{1-x^2}}$$

$$\frac{\mathrm{d}}{\mathrm{d}x}\arctan x = \frac{1}{1+x^2}$$

General rule for inverses.

$$\frac{\mathrm{d}}{\mathrm{d}x}f^{-1}(x) = \frac{1}{f'(f^{-1}(x))}$$

Here's some problems to practice these new rules.

(1) If $a(x) = \ln x$, find $a'(x)$ and $a''(x)$.
(2) Differentiate $b(x) = \ln(\cos x)$.
(3) If $c(x) = \arctan(x)$ find $c'(x)$ and $c''(x)$.
(4) Differentiate $d(x) = \log_{10}(\sec x)$.
(5) Differentiate $f(x) = x \ln x - x$.
(6) Differentiate $g(x) = \frac{\ln x}{x}$
(7) Differentiate $h(x) = \sin(x) \cdot \arcsin(x)$.
(8) Differentiate $j(x) = \tan(\arccos(x))$.