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1. Review of Inverse Trignometric Function.

For each of the following functions, pick a domain where the function is domain. Sketch the function, and state the range for that domain.

(a) $\arcsin(x)$

Domain:

Range:

(b) $\arccos(x)$

Domain:

Range:

(c) $\arctan(x)$

Domain:

Range:

2. Derivative of arcsin.

Last time, we saw that the derivative of an inverse function is $(f^{-1})'(x) =$
This formula assumes that

(i) f^{-1} exists on an interval around x and is differentiable at x;

(ii) f is differentiable at $f^{-1}(x)$;

(iii) $f'(f^{-1}(x)) \neq 0$.

Let's compute the derivative of $\arcsin x$.

(a) $\cos(\arcsin x)$ looks pretty gross, but it can be simplified. Use a trigonometric identity (or draw a right-angled triangle) to show that

$$\cos(\arcsin x) = \sqrt{1 - x^2}.$$

(b) Based on the graph of arcsin, on what interval is it differentiable?

(c) Compute the derivative of $\arcsin x$.

3. Derivative of arctan.

(a) Complete the following trigonometic identities:

$$\sin^2 x + \cos^2 x =$$

$$1 + \tan^2 x =$$

$$\arcsin x + \arccos x =$$

(b) Use a trigonometric identity to show that

$$\sec^2(\arctan x) = 1 + x^2.$$

(c) Based on the graph of arctan, on what interval is it differentiable?

(d) Compute the derivative of $\arctan x$.

4. Extra problems.

(a) Using a trigonometric identity and the derivative of $\arcsin x$, compute the derivative of $\arccos x$. (Once you have the right trigonometric identity, this is really easy.)

(b) Compute the derivative of $\arcsin(1-t)$. On what interval is this answer valid?