$\lim_{x \to 0} \cot^2 x = \infty$ problem

AHS 12/4/03

(12)

$\cot^2 x > 100$ want $|x - 0| < \delta$

$\cot x > 10$ → or → $\tan x < \frac{1}{10}$

$x < \arctan \frac{1}{10}$

Sign switches *

$\operatorname{arccot}(\cot x) < \operatorname{arccot} 10$

$x < \operatorname{arccot} 10$

$\arctan \frac{1}{10} = \operatorname{arccot} 10$

This is a general rule for the reciprocal trig functions

$\arccos x = \operatorname{arcsec} \frac{1}{x}$

$\arcsin x = \operatorname{arccsc} \frac{1}{x}$

Example:

$\sin \theta = x$

$\Rightarrow \theta = \arcsin x$

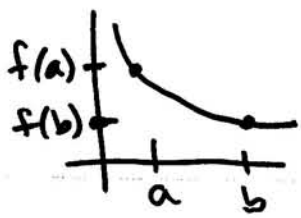
Also $\csc \theta = \frac{1}{x}$

$\therefore \theta = \operatorname{arccsc} \frac{1}{x}$

$\theta = \theta$

* The inequality switches when you take the arccot of both sides since ~~arccot~~ arccot is a decreasing function. (It's like multiplying by a negative.)

As x increases, y decreases. With an inverse relationship like this, an inequality reverses.



$a < b$ but $f(a) > f(b)$

sign switches when you apply a decreasing function f.