

Tuesday, October 11, 2016

4.2 Green Opener

HW ???s

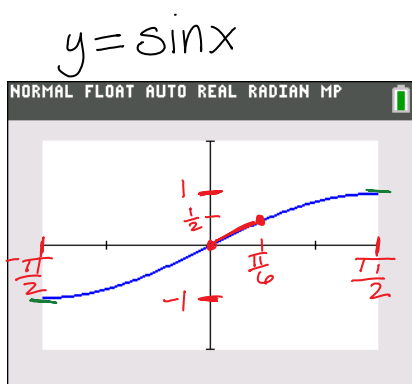
4.3 Derivatives of Inverse Trig

Quiz 4.2-4.3 Thursday!!!

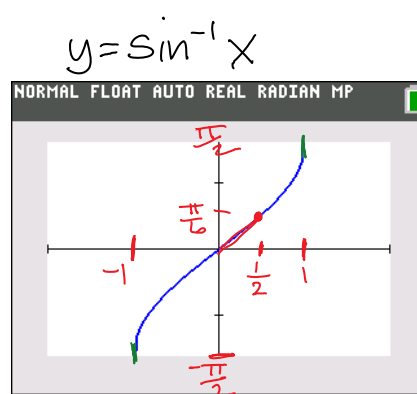


9LoLs.com

4.3 Derivatives of Inverse Trig Functions!



$$\text{slope} = \frac{1}{\frac{\pi}{6}} = \frac{6}{\pi}$$



$$\text{slope} = \frac{\frac{\pi}{6}}{\frac{1}{2}} = \frac{\pi}{3}$$

Inverses switch x & y
 If $f(x)$ is differentiable, then $f^{-1}(x)$ is too.
 (except where $f'(x) = 0$.)
 Slopes of Inverses (Derivatives) are Reciprocals.

Derivatives of Inverse Trig Functions

$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx} \cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$
$\frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$	$\frac{d}{dx} \cot^{-1} x = \frac{-1}{1+x^2}$
$\frac{d}{dx} \sec^{-1} x = \frac{1}{ x \sqrt{x^2-1}}$	$\frac{d}{dx} \csc^{-1} x = \frac{-1}{ x \sqrt{x^2-1}}$

Examples: Find derivative

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① $y = \cos^{-1} x^2$

$$\frac{dy}{dx} = \frac{-1}{\sqrt{1-(x^2)^2}} \cdot 2x = \frac{-2x}{\sqrt{1-x^4}}$$

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

$$\begin{aligned} \frac{dy}{dx} &= \frac{1}{\sqrt{1-\left(\frac{3}{t^2}\right)^2}} \cdot -6t^{-3} = \frac{-6}{t^3 \sqrt{1-\frac{9}{t^4}}} \cdot \frac{\sqrt{t^4}}{\sqrt{t^4}} \\ &= \frac{-6t^2}{t^3 \sqrt{t^4-9}} = \frac{-6}{t \sqrt{t^4-9}} \end{aligned}$$

③ Particle moves along the x-axis so position at time $t \geq 0$ is $x(t) = \tan^{-1} t$. Find velocity of particle at $t = 2$.

$$v(t) = x'(t) = \frac{1}{1+t^2}$$

$$v(2) = \frac{1}{1+2^2} = \frac{1}{5}$$