Toufiqul Hoque
MATH 2312
Pre-Calculus II
Mr. Aguirre

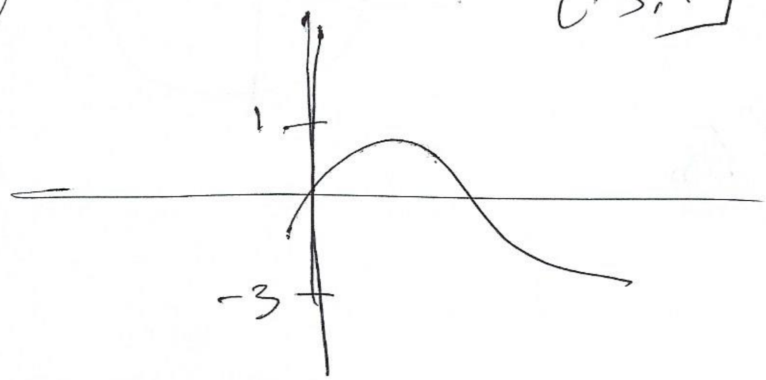
ex: find inverse function f^{-1}
find range/domain of f^{-1}

10/29/2018

Lastone

A

$[-3, 1]$



$-1 \le \sin x \le 1$

$-2 \le 2\sin x \le 2$

$-3 \le 2\sin x - 1 \le 1$

ex: $f(x) = -2\cos(3x)$

$y = -2\cos(3x)$

$x = -2\cos(3y)$

$-\frac{x}{2} = \cos(3y)$

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

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

Domain f

$0 \le x \le \frac{\pi}{3}$

$-1 \le \cos x \le 1$

$-1 \le \cos 3x \le 1$

$2 \le -2\cos 3x \le -2$

$[-2, 2]$

ex : solve

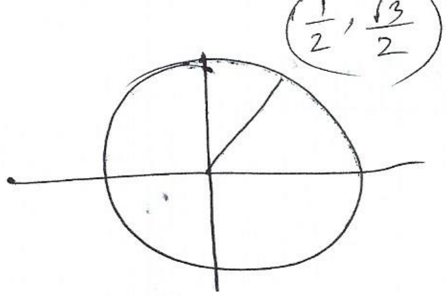
$$3\sin^{-1}x = \pi$$

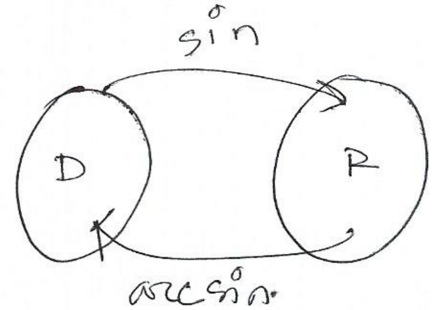
$$\sin^{-1}x = \frac{\pi}{3}$$

$$x = \sin\frac{\pi}{3}$$

$$x = \sin 60^\circ$$

$$x = \frac{\sqrt{3}}{2}$$





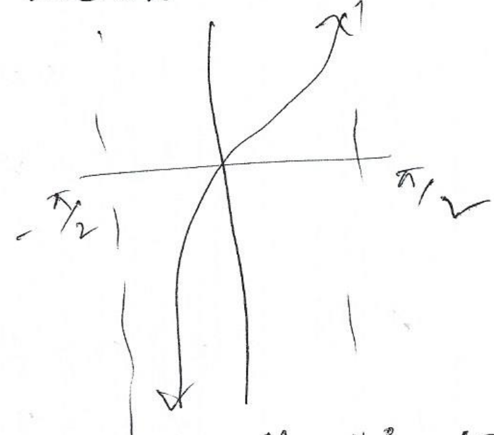
ex. find exact value

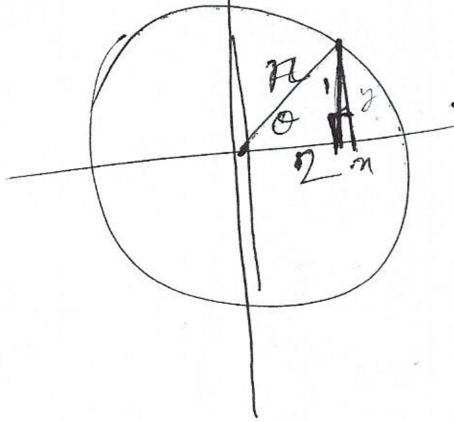
$$\sin(\underbrace{\tan^{-1} 1/2}_{\theta})$$

$$= \sin\theta \quad = \frac{y}{r}$$

$$\theta = \tan^{-1}\frac{1}{2} \qquad -\frac{\pi}{2} < \theta < \frac{\pi}{2}$$

$$\tan\theta = \frac{1}{2} = \frac{y}{x}$$





→ not unit circle.

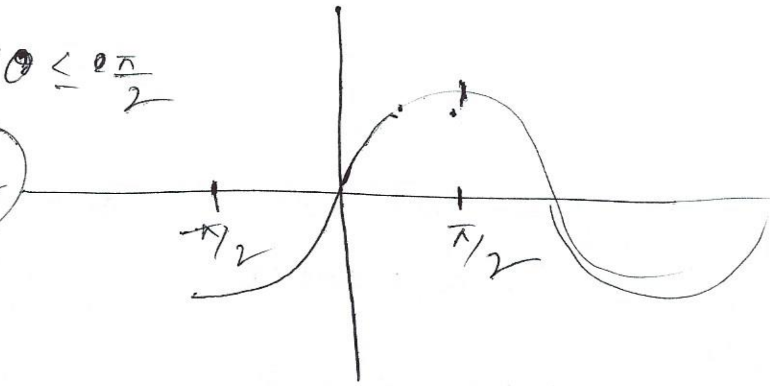
$$4 + 1 = r^2$$

$$r = \sqrt{5}$$

ex: $\cos(\sin^{-1}(-\frac{1}{3}))$

$\cos\theta$ $\qquad -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$

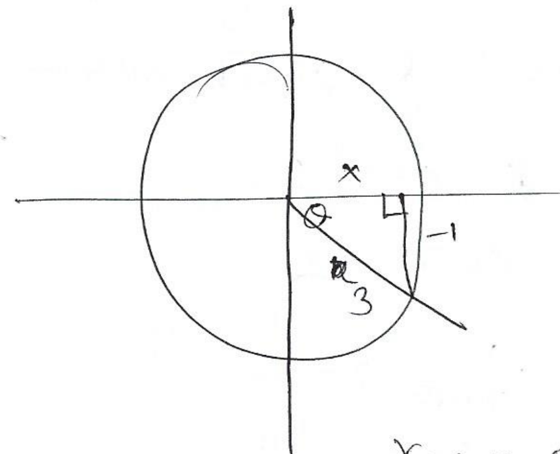
$\theta = \sin^{-1}(-\frac{1}{3}) = \frac{y}{r}$



$\cos\theta = \frac{x}{r}$

$= \frac{2\sqrt{2}}{3}$.

QI, QIV



$x^2 + 1 = 9$

$x^2 = 8$

$x = 2\sqrt{2}$

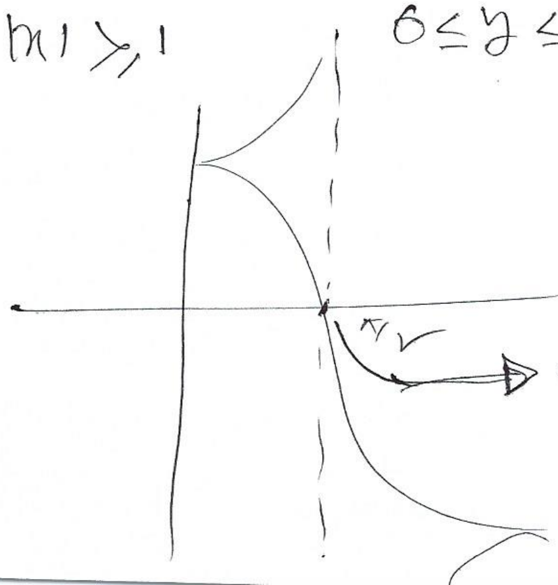
Define csc, sec, cot

$y = \sec^{-1} x$

$x = \sec y$

$y = \operatorname{arcsec} x$.

$|x| \geq 1$ $\qquad 0 \le y \le \pi$, $y \neq \frac{\pi}{2}$.



cos is 0 and $\frac{1}{\cos} = \sec$ so $\frac{1}{0}$ = undefined.

$|x| \geq 1$ $\quad -\frac{\pi}{2} \leq y \leq \frac{\pi}{2} \quad y \neq 0$

$y = \cot^{-1} x \quad x = \cot y.$

$= \text{arc} \cot x$

$-\infty \leq x \leq \infty \quad 0 < y < \pi$

ex: find exact value

$\theta = \csc^{-1} 2$

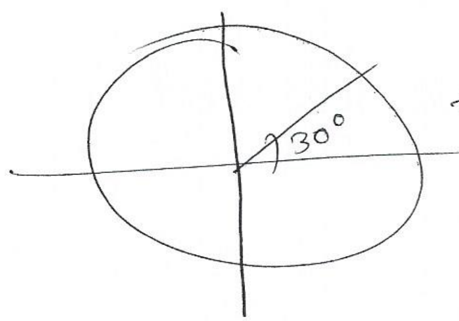
$-\frac{\pi}{2} < \theta < \frac{\pi}{2}$

$Q\,I, Q\,IV$

$\csc\theta = 2$

$\frac{1}{\sin\theta} = 2$

$\sin\theta = \frac{1}{2}$



$\pi/6$

$\theta = \frac{\pi}{6}$

ex Rewrite expression with u, but no trig $f(x)$.
as (algebric)

$\sin(\underbrace{\tan^{-1} u}_{\theta}) = \sin\theta$

$\theta = \tan^{-1} u$

$u = \tan\theta.$

$$\sin\theta \frac{\cos\theta}{\cos\theta} = \tan\theta \cdot \cos\theta.$$

$$= \tan\theta \cdot \frac{1}{\sec\theta}$$

$$= \frac{\tan\theta}{\sec\theta}$$

$$\cos^2\theta + \sin^2\theta = 1$$

$$= \cancel{\tan} \frac{\tan\theta}{\sqrt{1+\tan^2\theta}}$$

$$1 + \tan^2\theta = \sec^2\theta$$

$$\sec\theta = \sqrt{1+\tan^2\theta}$$

$$= \sqrt{1+u^2}$$

$$= \frac{u}{\sqrt{1+u^2}}.$$

$$\tan(\underbrace{\cos^{-1} u}_{\theta})$$

$$\tan\theta$$

$$= \frac{\sin\theta}{\cos\theta}$$

$$= \frac{\sqrt{1-u^2}}{u}.$$

$$\cos^2\theta + \sin^2\theta = 1$$

$$u^2 + \sin^2\theta = 1$$

$$\sin\theta = \sqrt{1-u^2}$$