

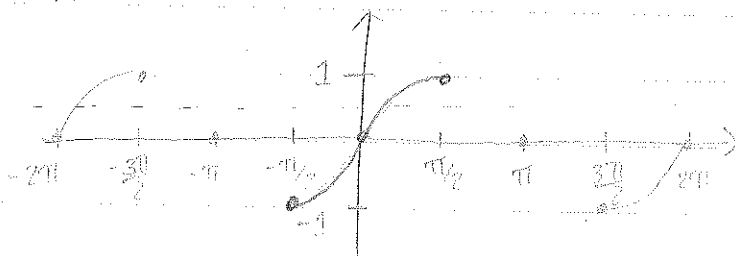
INVERSE TRIGONOMETRIC FUNCTIONS 7.6

One-to-one function - A function that has an inverse.

- 1.) function (every x has exactly 1 y) (Vertical Line Test)
- 2.) every y -value has exactly one x -value (Horizontal Line Test)

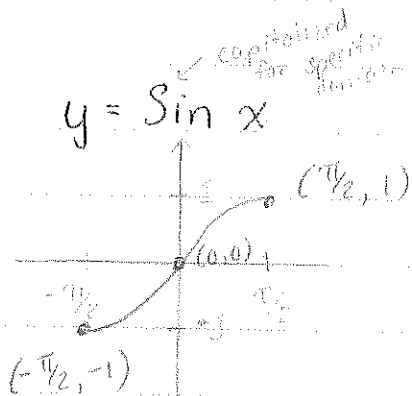


$$y = \sin x$$



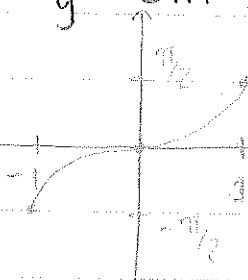
* Not one-to-one
(No inverse)

$$y = \sin x$$



x are: for one

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



* x & y 's switch

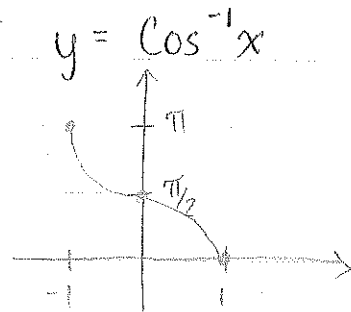
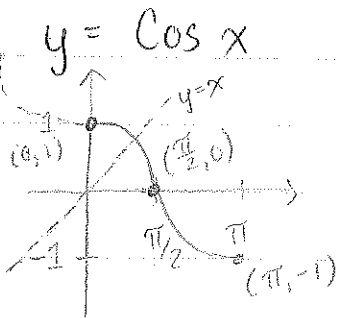
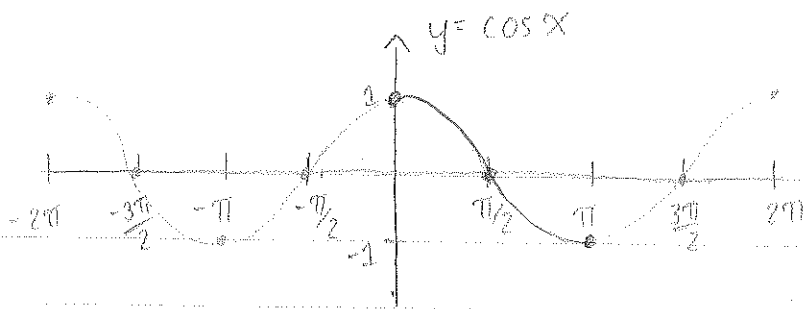
$$\text{Domain: } \{x \mid -\pi/2 \leq x \leq \pi/2\}$$

$$\text{Range: } \{y \mid -1 \leq y \leq 1\}$$

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* values are now inputs & angles are outputs

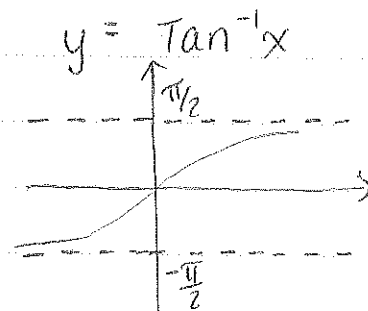
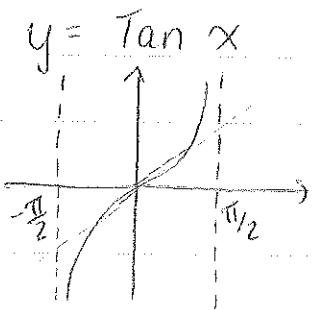


Domain: $\{x \mid 0 \leq x \leq \pi\}$

Range: $\{y \mid -1 \leq y \leq 1\}$

Domain: $\{x \mid -1 \leq x \leq 1\}$

*Range: $\{y \mid 0 \leq y \leq \pi\}$



Domain: $\{x \mid -\pi/2 < x < \pi/2\}$

Range: \mathbb{R}

Domain: \mathbb{R}

*Range: $\{y \mid -\pi/2 < y < \pi/2\}$

INVERSE FUNCTIONS

* Asking for the angle outputs are angles

$$\theta = \sin^{-1} x$$

$$-\pi/2 \leq \theta \leq \pi/2$$

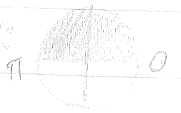
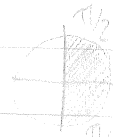
$$\theta = \cos^{-1} x$$

$$0 \leq \theta \leq \pi$$

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

$$-\pi/2 < \theta < \pi/2$$

Range on inverse graphs



Ex Find $\sin^{-1}(\frac{1}{2}) = 30^\circ$
 Find $\sin^{-1}(\frac{1}{2}) = 30^\circ$

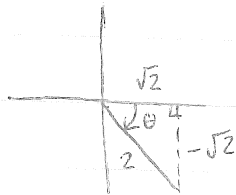
Ex ① Find $\sin^{-1}(0.6)$

Degree Mode = 36.9°

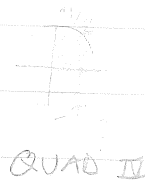
Radian Mode = 0.64 radians

② Find $\tan^{-1}(-1) = \theta$

and $-\pi/2 < \theta < \pi/2$

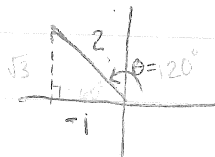


$$\theta = -\pi/4$$

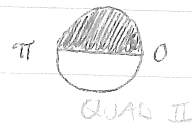


$\sec^{-1}(-2)$ ③ $\cos^{-1}(-\frac{1}{2}) = \theta$

$\theta = 120^\circ$ or $2\pi/3$



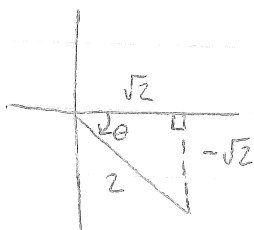
$$\theta = 120^\circ \text{ or } \frac{2\pi}{3}$$



* Find $\sin^{-1}(1)$

$(0, 1)$ 90°

④ $\sin^{-1}(-\frac{\sqrt{2}}{2}) = \theta$



$$\theta = -\pi/4 \text{ or } -45^\circ$$

