

## 4.6 | The Inverse of Sine, Cosine, and Tangent

Objectives:

- 1) Find the exact value of inverse sin, cos, and tan functions.
- 2) Use a calculator to find approximate values of inverse sin, cos, and tan functions.
- 3) Know the properties of inverse functions.

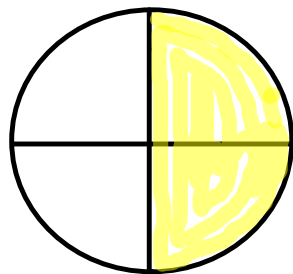
\*\*new symbol:  $\text{Sin}^{-1}$ , or Arcsin

Domain restrictions for  $\Theta$  are as follows: (Principle Value)

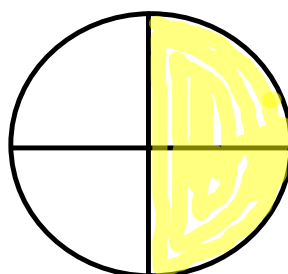
$$\text{Sin}^{-1} \quad -\pi/2 \leq \Theta \leq \pi/2 \quad (\text{Quadrants I and IV})$$

$$\text{Tan}^{-1} \quad -\pi/2 < \Theta < \pi/2 \quad (\text{Quadrants I and IV})$$

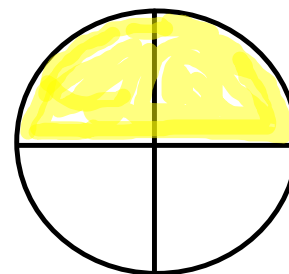
$$\text{Cos}^{-1} \quad 0 \leq \Theta \leq \pi \quad (\text{Quadrants I and II})$$



$$\text{Sin}^{-1} \quad -\pi/2 \leq \Theta \leq \pi/2$$



$$\text{Tan}^{-1} \quad -\pi/2 < \Theta < \pi/2$$



$$\text{Cos}^{-1} \quad 0 \leq \Theta \leq \pi$$

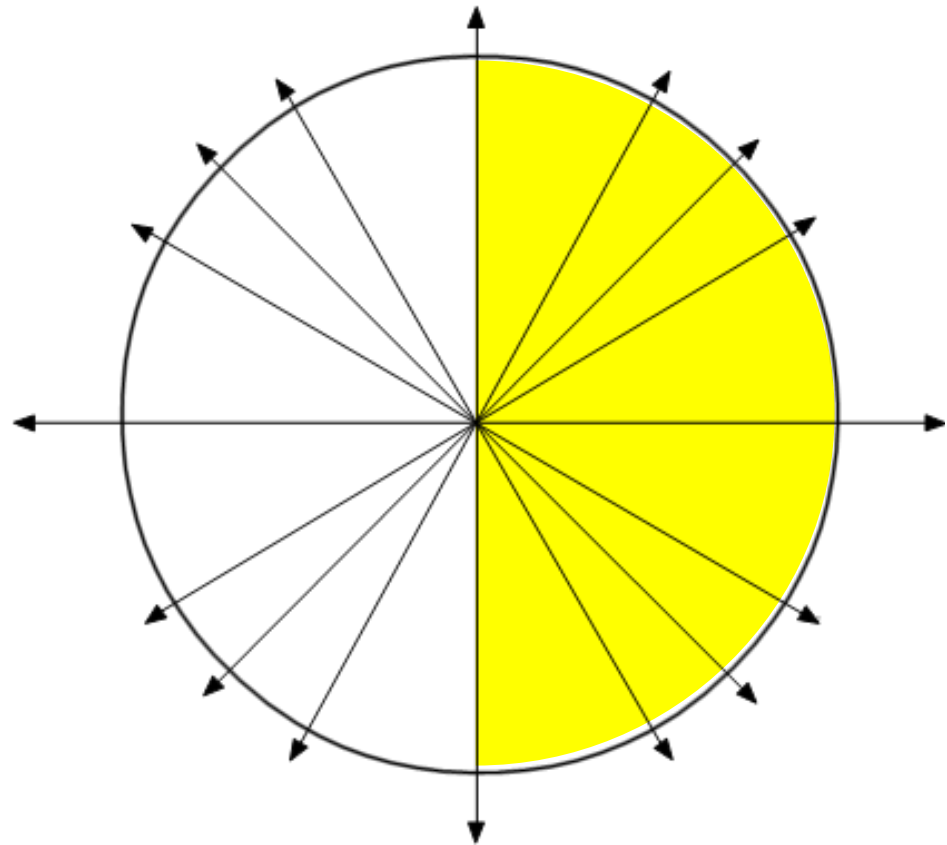
# Use the Unit Circle to solve!

Ex. 1  $\sin^{-1}(1)$

(means **find the angle** where  $\sin \theta = 1$ )

Answer:

?

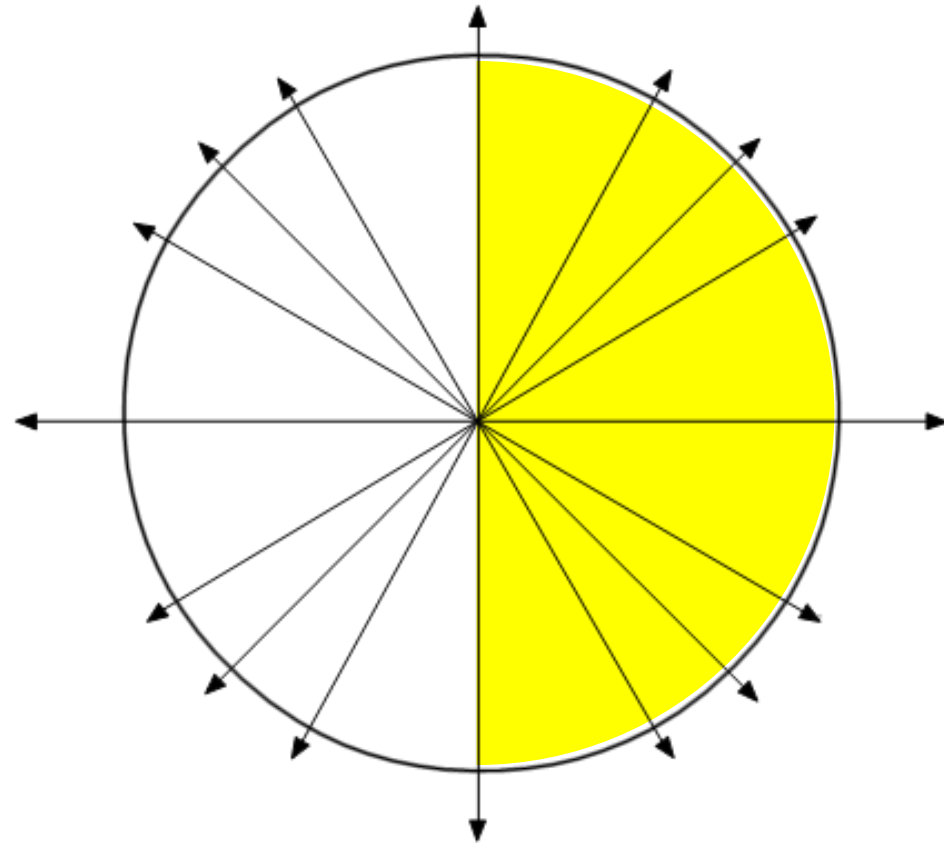


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Ex. 2  $\text{Sin}^{-1}(-1/2)$

(means **find the angle**  $\Theta$  where  $\sin\Theta = -1/2$ )

Answer:

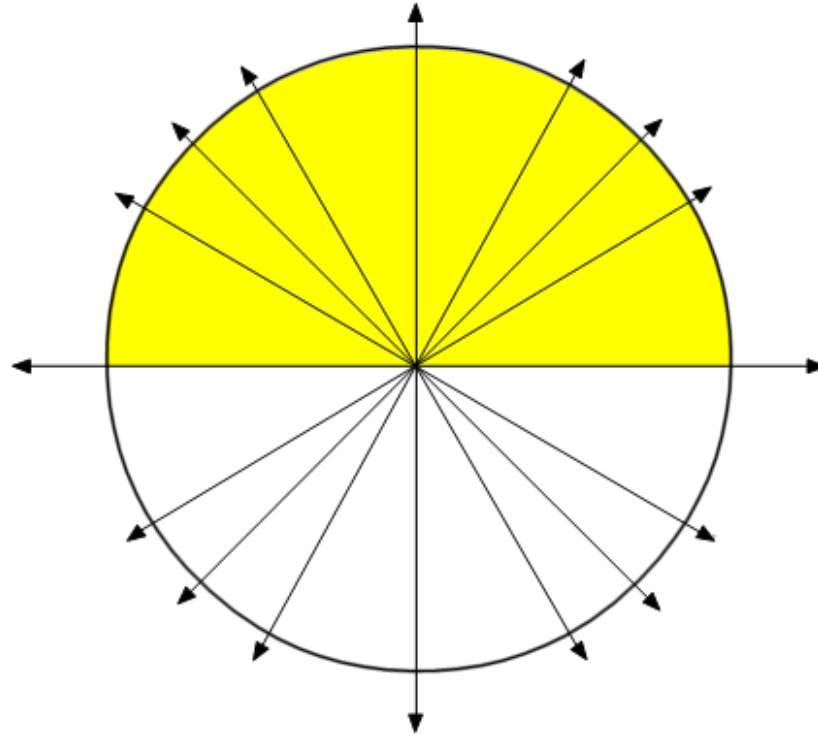


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Ex. 3  $\text{Cos}^{-1}(0)$

(means **find the angle**  $\Theta$  where  $\cos \Theta=0$ )

Answer: 



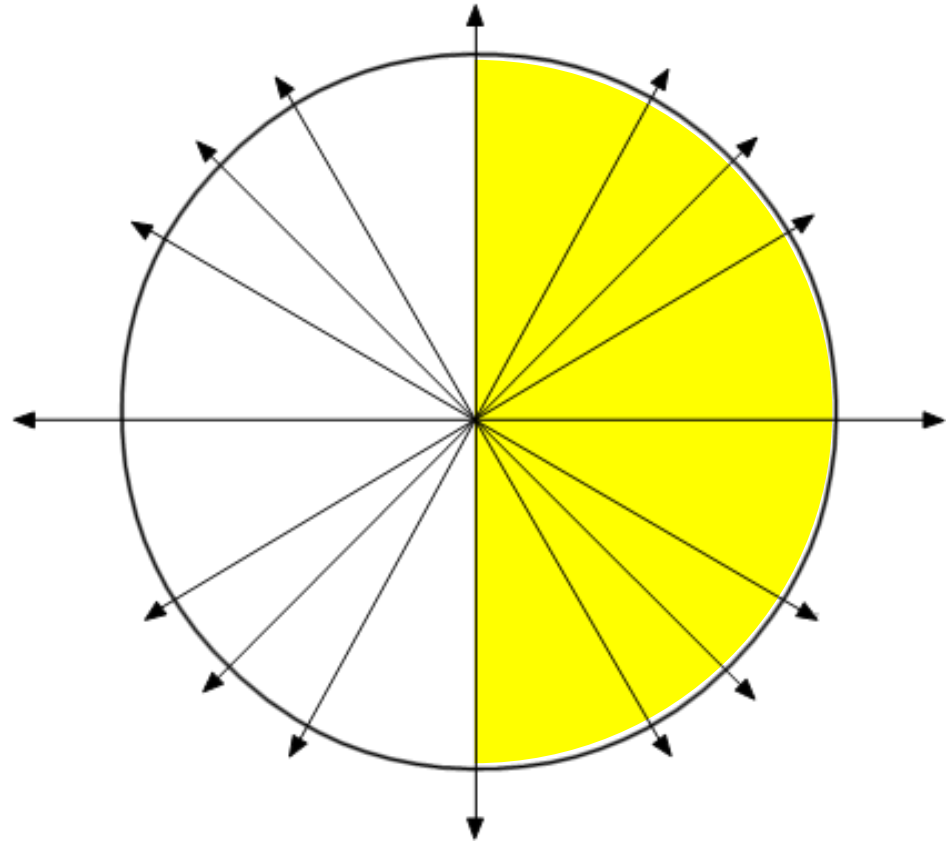
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Ex. 4  $\text{Tan}^{-1}(-\sqrt{3})$

(means **find the angle**  $\Theta$  where  $\tan \Theta = -\sqrt{3}$  )

Answer:

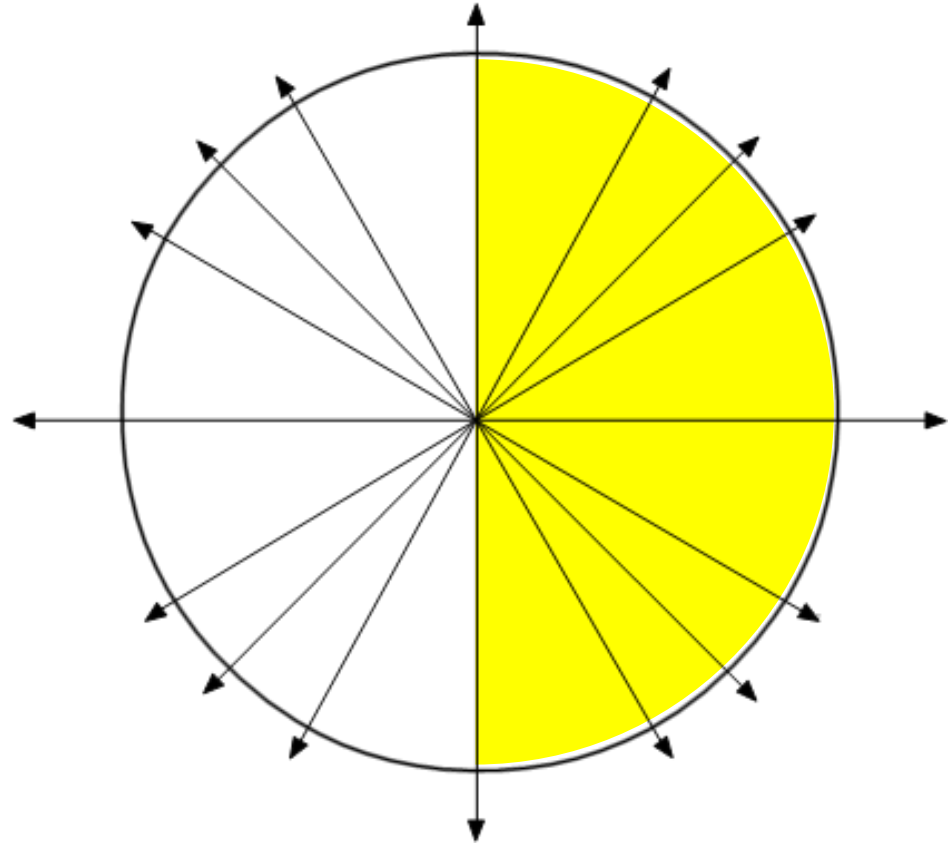
?



Ex. 5  $\tan^{-1}(1)$

(means **find the angle**  $\Theta$  where  $\tan \Theta = 1$ )

Answer: 



## Properties to Know

1)  $\text{Sin}^{-1}(\sin\Theta) = \Theta$  where  $-\pi/2 \leq \Theta \leq \pi/2$

2)  $\sin(\text{Sin}^{-1}x) = x$  where  $-1 \leq x \leq 1$

3)  $\text{Cos}^{-1}(\cos\Theta) = \Theta$  where  $0 \leq \Theta \leq \pi$

4)  $\cos(\text{Cos}^{-1}x) = x$  where  $-1 \leq x \leq 1$

5)  $\text{Tan}^{-1}(\tan\Theta) = \Theta$  where  $-\pi/2 < \Theta < \pi/2$

6)  $\tan(\text{Tan}^{-1}x) = x$

# Note:

To use your calculator use 2<sup>nd</sup> sin, cos, or tan.  
Be aware of your mode (degrees or radians).



# Assignment:

W.S. 4.6: Day 1 (1-44 all)

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