4.3 Principal Inverse Values

Warm-Up Monday

1. Find the inverse values in radians.

$\sin^{-1}\left(-\frac{1}{2}\right)$ $\tan^{-1}\left(-\sqrt{3}\right)$ $\sin^{-1}(-1)$ $\cos^{-1}0$

2. How many answers does an inverse usually have?

About Me:

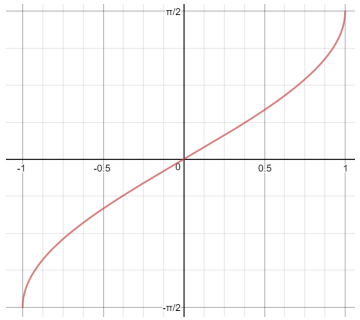
1. Where is the farthest place you've ever traveled to?
2. Where is your favorite place you've ever traveled to?

4.3 Principal Inverse Values

EQ: How do I find the principal inverse value in the restricted range?

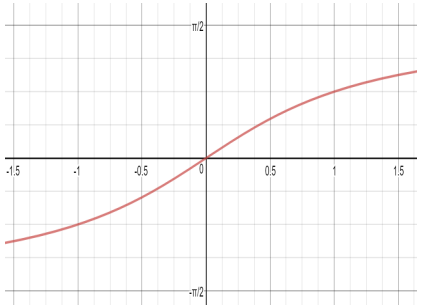
ONE ANSWER

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

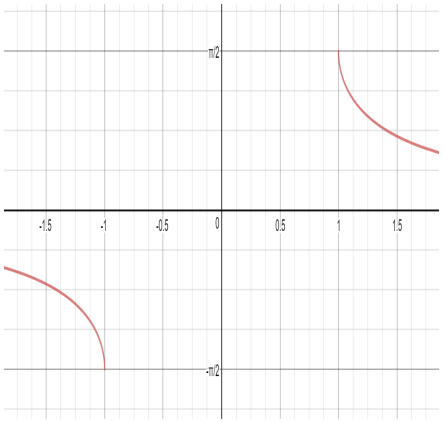


$y = \cos^{-1} x$

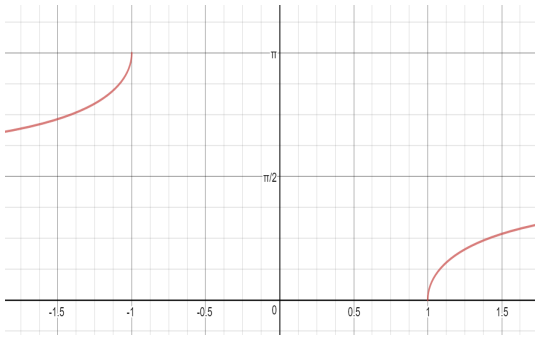
$y = \tan^{-1} x$



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



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



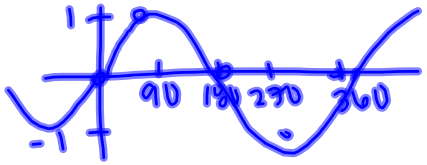
$y = \cot^{-1} x$

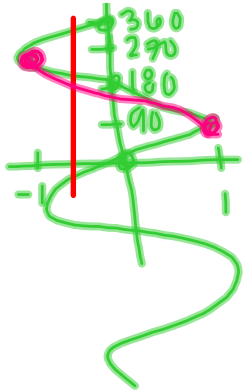
inverse → switch x & y

$y = \sin x$

$x = \sin y$

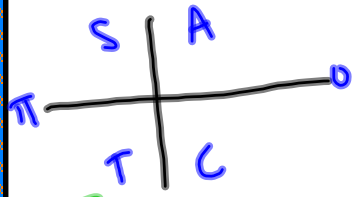
$\sin^{-1}(x) = y$





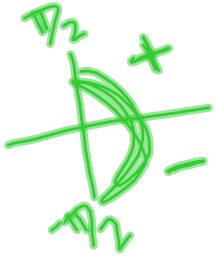
4.3 Principal Inverse Values

EQ: How do I find the principal inverse value in the restricted range?



Restricted Ranges

$-\frac{\pi}{2}, \frac{\pi}{2}$	$0, \pi$
sin	cos
csc	sec
tan	cot



+ QI

− QIV

↳ −ref angle

+ QI

− QII

4.3 Principal Inverse Values

EQ: How do I find the principal inverse value in the restricted range?

Find the principal inverse value for each expression.

(in degrees)

$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

1. $\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ QIV

ref < 45°

-ref <

$\boxed{-45°}$

2. $\cot^{-1}\left(-\frac{\sqrt{3}}{1}\right)$ QII

top of x → $\frac{x}{y}$

top of y →

$\boxed{150°}$

(in radians)

3. $\csc^{-1}\left(\sqrt{2}\right)$ QI

flip y

$\frac{\sqrt{2}}{1}$

$\boxed{\frac{\pi}{4}}$

4. $\cos^{-1} 0$

(x, y)

(cos, sin)

x = 0

$\boxed{\frac{\pi}{2}}$, $\frac{3\pi}{2}$

not in RR

ODDS

4.3 Principal Inverse Values Name:_____

Find the exact principal value in degrees:

$\theta = \sin^{-1}\left(-\frac{1}{2}\right)$

1. $\theta = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

2. $\theta = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

3. $\theta = \arcsin\left(-\frac{1}{2}\right)$

4. $\theta = \cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

5. $\theta = \arctan(1)$

6. $\theta = \arcsin(1)$

7. $\theta = \cos^{-1}(-1)$

8. $\theta = \sin^{-1}(0)$

9. $\theta = \tan^{-1}(-1)$

10. $\theta = \arccos\left(\frac{1}{2}\right)$

11. $\theta = \arcsin(-1)$

$-90, 90$

$-\frac{\pi}{2}, \frac{\pi}{2}$

$\theta = \sin^{-1}(-1)$

$y = -1$

$\boxed{-90^\circ}$

270 ← not in RR

$\frac{3\pi}{2}$

12. $\theta = \cos^{-1}(0)$

Find the exact principle value in radians:

13. $x = \cot^{-1}\left(-\sqrt{3}\right)$

14. $x = \arccos\left(-\frac{1}{2}\right)$

15. $x = \tan^{-1}\left(-\sqrt{3}\right)$

16. $x = \sec^{-1}\left(-\sqrt{2}\right)$

17. $x = \operatorname{arccsc}(2)$

18. $x = \sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$

19. $x = \sin^{-1}(0)$

20. $x = \arccos\left(-\frac{\sqrt{2}}{2}\right)$

21. $x = \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

22. $x = \sec^{-1}(-1)$

23. $x = \tan^{-1}(0)$

24. $x = \cot^{-1}(-1)$

25. $x = \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

26. $x = \operatorname{arcsec}(-2)$

27. $x = \csc^{-1}(-1)$

28. $x = \cot^{-1}\left(-\sqrt{3}\right)$

29. $x = \sin^{-1}(2)$

30. $x = \operatorname{arcsec}\left(\frac{1}{2}\right)$

4.3 Principal Inverse Values

EQ: How do I find the principal inverse value in the restricted range?

Closing

Find the principal inverse value for each expression.

1. (degrees)

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

2. (radians)

$$x = \sec^{-1}(-1)$$