

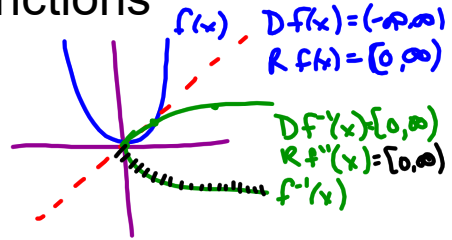
4.7 Inverse Trig Functions

Graphs of inverse trig functions

Ranges of inverse trig functions

Evaluating

Compositions



Feb 13-9:27 AM

GO COUGARS!

Homework Questions

In Exercises 1-14, find the period and amplitude.

1. $y = 3 \sin 2x$ 2. $y = 2 \cos 3x$

3. $y = \frac{1}{2} \cos \frac{x}{2}$ 4. $y = -3 \sin \frac{x}{3}$

5. $y = \frac{1}{2} \sin \pi x$ 6. $y = \frac{1}{2} \cos \frac{\pi x}{2}$

7. $y = -2 \sin 4x$ 8. $y = \cos \frac{\pi x}{3}$

9. $y = \frac{1}{2} \cos \frac{\pi x}{2}$ 10. $y = \frac{1}{2} \sin \frac{\pi x}{3}$

11. $y = \frac{1}{2} \sin 4\pi x$ 12. $y = \frac{1}{2} \cos \frac{\pi x}{4}$

In Exercises 15-22, describe the relationship between the graphs of each pair of functions. Give the period, amplitude, and phase shift.

15. $f(x) = \sin x$ 16. $f(x) = \cos x$

17. $f(x) = \sin 2x$ 18. $f(x) = \sin 3x$

19. $f(x) = \sin x$ 20. $f(x) = \sin(x - \pi)$

21. $f(x) = \sin 2x$ 22. $f(x) = \cos 2x$

In Exercises 23-26, describe the relationship between the graphs of each pair of functions. Give the period, amplitude, and phase shift.

23. $f(x) = \sin x$ 24. $f(x) = \sin(x - \pi)$

25. $f(x) = \sin x$ 26. $f(x) = \sin(x + \pi)$

In Exercises 27-34, sketch the graph of each in the Cartesian coordinate plane. (Include two full periods.)

27. $f(x) = \sin x$ 28. $f(x) = \cos x$

29. $f(x) = \sin 2x$ 30. $f(x) = 2 \sin 2x$

31. $f(x) = \frac{1}{2} \sin \frac{x}{2}$ 32. $f(x) = 4 \sin \pi x$

33. $f(x) = \frac{1}{2} \cos \frac{x}{2}$ 34. $f(x) = 4 \sin \pi x - 2$

In Exercises 35-40, sketch the graph of the function by hand. Check graphing utility to verify your sketch. (Include two full periods.)

35. $y = 3 \sin x$ 36. $y = \frac{1}{2} \cos x$

37. $y = -\cos \frac{x}{2}$ 38. $y = \sin 4x$

39. $y = \sin(x - \frac{\pi}{2})$ 40. $y = \sin(x - \pi)$

41. $y = -4 \sin(x + \pi)$ 42. $y = 3 \cos(x + \frac{\pi}{2})$

43. $y = \frac{1}{2} \cos(x - \frac{\pi}{2})$ 44. $y = -3 \sin(x + \pi)$

45. $y = -1 \sin(x + \pi)$ 46. $y = 4 \cos(x - \frac{\pi}{2})$

47. $y = \cos(x - \frac{\pi}{2}) + 1$ 48. $y = \sin(x + \frac{\pi}{2}) - 1$

49. $y = \cos(x - \frac{\pi}{2}) + 1$ 50. $y = \sin(x + \frac{\pi}{2}) - 1$

Original Exercises: In Exercises 51-54, find A , B , C , and D for the function $f(x) = A \sin(Bx + C) + D$ such that the graph of f matches the graph shown.

51.

52.







53.

54.

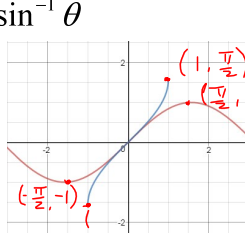
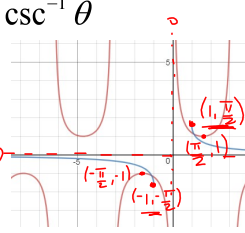
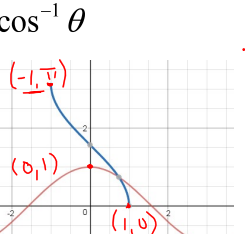
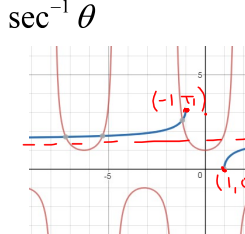
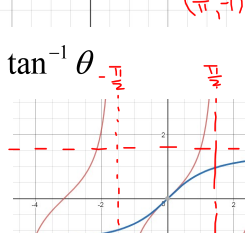
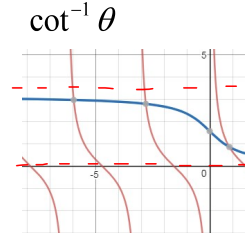
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4.7 Day 1 inverse trig functions (2).notebook

Let's review the domains and ranges of the six trig functions we are familiar with.

	domain	range
 $\sin x$	$(-\infty, \infty)$	$[-1, 1]$
 $\cos x$	$(-\infty, \infty)$	$[-1, 1]$
 $\tan x$	$(-\infty, \infty) \ x \neq \frac{k\pi}{2}$ k is an odd integer	$(-\infty, \infty)$
 $\csc x$	$(-\infty, \infty) \ x \neq k\pi$ k is an integer	$(-\infty, -1] \cup [1, \infty)$
 $\sec x$	$(-\infty, \infty) \ x \neq \frac{k\pi}{2}$ k is an odd integer	$(-\infty, -1] \cup [1, \infty)$
 $\cot x$	$(-\infty, \infty) \ x \neq k\pi$ k is an integer	$(-\infty, \infty)$



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 $\sin^{-1} \theta$	Domain $[-1, 1]$ Range $[-\frac{\pi}{2}, \frac{\pi}{2}]$	 $\csc^{-1} \theta$	Domain $(-\infty, -1] \cup [1, \infty)$ Range $[-\frac{\pi}{2}, \frac{\pi}{2}]$ $x \neq 0$
 $\cos^{-1} \theta$	Domain $[-1, 1]$ Range $[0, \pi]$	 $\sec^{-1} \theta$	Domain $(-\infty, -1] \cup [1, \infty)$ Range $[0, \pi]$ $x \neq \frac{\pi}{2}$
 $\tan^{-1} \theta$	Domain $(-\infty, \infty)$ Range $(-\frac{\pi}{2}, \frac{\pi}{2})$	 $\cot^{-1} \theta$	Domain $(-\infty, \infty)$ Range $(0, \pi)$

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4.7 Day 1 inverse trig functions (2).notebook


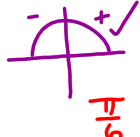


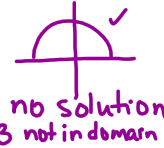
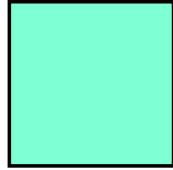
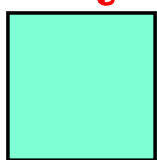
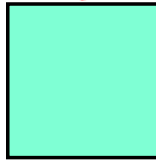
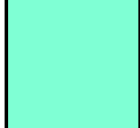
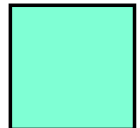
summary — Memorize the ranges!

	$\cos^{-1} x$	$[0, \pi]$		$\sin^{-1} x$	$[-\frac{\pi}{2}, \frac{\pi}{2}]$
$\cos^{-1} x$	$(0, \pi)$		$\tan^{-1} x$		$(-\frac{\pi}{2}, \frac{\pi}{2})$
$\sec^{-1} x$	$[0, \pi]$		$\csc^{-1} x$		$[-\frac{\pi}{2}, \frac{\pi}{2}]$
	$x \neq \frac{\pi}{2}$				$x \neq 0$

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$\sin^{-1} \theta$ means the same as $\arcsin \theta$
 $\sin^{-1} \theta$ and $\arcsin \theta$ are kinda like $\sin \theta = x$ 2 solutions
 but with the restrictions imposed by the inverse function
 (1 solution)

Evaluate the inverse function use radians!

$\arcsin\left(-\frac{1}{\sqrt{2}}\right)$	$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$	$\tan^{-1}(-\sqrt{3})$	$\arctan(0) = 0$	$\arccos(3)$
				
$-\frac{\pi}{4}$	$\frac{\pi}{6}$	$-\frac{\pi}{3}$		
				

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4.7 Day 1 inverse trig functions (2).notebook

Compositions

$$\tan\left(\arctan\left(\frac{1}{\sqrt{3}}\right)\right)$$

$$\tan\left(\frac{\pi}{6}\right)$$

$$\frac{1}{\sqrt{3}}$$

$$\arccos(\cos \pi)$$

$$\arccos(-1)$$

$$\pi$$

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BUT....

$$\arcsin\left(\sin\left(\frac{5\pi}{6}\right)\right)$$

^{QII}

$$\arcsin\left(\frac{1}{2}\right) = \frac{\pi}{6}$$

~~$\frac{5\pi}{6}$~~

$$\arccos\left(\cos\left(\frac{5\pi}{6}\right)\right)$$

^{II}

~~$\frac{5\pi}{6}$~~

$$\frac{5\pi}{6}$$

$$\cos(\arctan(-1))$$

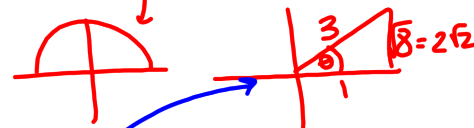
~~$\frac{\pi}{4}$~~

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


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4.7 Day 1 inverse trig functions (2).notebook

If the value is not a common ratio:

$$\tan\left(\arccos\left(\frac{1}{3}\right)\right) \quad \cos \theta = \frac{1}{3}$$


$$\tan \theta = 2\sqrt{2} \quad 1^2 + b^2 = 3^2$$

$$\cot(\arcsin(-2x)) = \frac{\sqrt{1-4x^2}}{-2x} \quad x \neq 0$$


$$1^2 = (-2x)^2 + b^2$$

$$1^2 = 4x^2 + b^2$$

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HOMework



p 327 1-9 odd, 27-60 by 3's

Workbook p 109-110

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