

3.1 Inverse Values [0, 2π)

Name: _____

Find the exact value(s) of θ (in radians), where $0 \leq \theta < 2\pi$

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

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

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

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

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

9. $\tan \theta = (-1)$

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

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

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

13. $\theta = \cot^{-1}(-\sqrt{3})$

14. $\theta = \arccos\left(-\frac{\sqrt{2}}{2}\right)$

15. $\tan \theta = \left(\frac{-\sqrt{3}}{3}\right)$

3.2 General Solutions of Inverse Values

Name: _____

For each problem find the exact:

- a.) general solution in **radians**
- b.) first three positive values of x

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

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

$$3. \quad \tan x = \left(-\sqrt{3} \right)$$

$$4. \quad \sin x = \left(-\frac{1}{\sqrt{2}} \right)$$

$$5. \quad x = \cos^{-1} \left(-\frac{\sqrt{3}}{2} \right)$$

$$6. \quad \cos x = \left(-\frac{\sqrt{2}}{2} \right)$$

$$7. \quad x = \tan^{-1}(-1)$$

$$8. \quad x = \csc^{-1}(-2)$$

$$9. \quad x = \cos^{-1}(0)$$

$$10. \quad \sin x = (-1)$$

$$11. \quad x = \sec^{-1}(-2)$$

$$12. \quad x = \cot^{-1}(\sqrt{3})$$

3.3 Evaluation of Sinusoidal Functions

Name: _____

#1-4 For each of the following functions use **algebraic** methods to:

- a.) Find $f(x)$ for the given value of x
- b.) Find the general solutions and the first three positive values of x for the given value of $f(x)$

Round to three decimal places.

$$1. \quad f(x) = 2 + 5 \cos \frac{\pi}{10}(x - 3)$$

- a.) Find $f(8.3)$

- b.) $f(x) = 5$

$$2. \quad y = 4 + 3 \sin \frac{\pi}{6}(x - 2)$$

- a.) Find $f(12.7)$

- b.) $f(x) = 6$

$$3. \quad y = -2 + 4 \sin \frac{\pi}{2}(x - 0.3)$$

- a.) Find $f(2.8)$

- b.) $f(x) = 0$

4. $y = -1 + 3 \cos \frac{\pi}{3}(x + 5.2)$

a.) Find $f(5)$

b.) $f(x) = 1$

#5-8 For each of the following functions *use your graphing calculator* to:

c.) Find $f(x)$ for the given value of x

d.) Find the first three positive values of x for the given value of $f(x)$

Round to three decimal places.

5. $y = 3 + 5 \sin \frac{\pi}{9}(x - 11)$

a.) Find $f(7)$

b.) $f(x) = 2$

6. $y = 1 + 6 \cos \frac{\pi}{13}(x - 20)$

a.) Find $f(4.3)$

b.) $f(x) = -4.5$

7. $y = 5 + 4 \sin \frac{\pi}{12}(x + 10)$

a.) Find $f(1)$

b.) $f(x) = 2.5$

8. $y = 1 + 3 \cos \frac{\pi}{8}(x + 7)$

a.) Find $f(13)$

b.) $f(x) = -1$

Name: _____

3.4 Inverse Trig Functions Exit Ticket

1. How do you find an inverse of a function?

Sketch the function and list the restricted range

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

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

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

List the restricted range for each function

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

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

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

Name: _____

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

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

3.4 The rest of the inverse trig functions...

Name: _____

Remember... \csc is the reciprocal of _____. \sec is the reciprocal of _____.

Part 1. If the restricted range of the inverse sine function is _____, what is the restricted range of the inverse cosecant function?

Fill in the table with the appropriate cosecant values

x	Csc(x)
$-\frac{\pi}{2}$	
0	
$\frac{\pi}{2}$	

Remember, to find an inverse of a function, switch your x & y values.

x	$\text{Csc}^{-1}(x)$

If a function value is undefined, what attribute will appear on the graph? HINT: think of the graph of normal cosecant. What happens every π radians?

Sketch the graph of $y = \csc^{-1}(x)$ below. Label each critical point and any horizontal asymptotes.

What value does the function approach as x approaches positive infinity? What value does the function approach as x approaches negative infinity?

Part 2. If the restricted range of the inverse cosine function is _____, what is the restricted range of the inverse secant function?

Fill in the table with the appropriate secant values

x	sec(x)
0	
$\frac{\pi}{2}$	
π	

Find your inverse critical values and fill in the table below.

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

What happens at $x = \frac{\pi}{2}$?

Sketch the graph of $y = \sec^{-1}(x)$ below. Label each critical point and any horizontal asymptotes.

What value does the function approach as x approaches positive infinity? What value does the function approach as x approaches negative infinity?

Part 3. The restricted range of the inverse cotangent function is $(0, \pi)$. What do the parenthesis tell you will happen at those end points?

Fill in the table with the appropriate cotangent values

x	$\cot(x)$
0	
$\frac{\pi}{4}$	
$\frac{\pi}{2}$	
$\frac{3\pi}{4}$	
π	

Find your inverse critical values and fill in the table below.

x	$\cot^{-1}(x)$

What happens at $x=0$ and $x=\pi$?

Sketch the graph of $y = \cot^{-1}(x)$ below. Label each critical point and any horizontal asymptotes.

What value does the function approach as x approaches positive infinity? What value does the function approach as x approaches negative infinity?

3.5 Principal Inverse Values

Name: _____

Find the exact principal value in radians:

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

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

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

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

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

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

$$7. \cos \theta = (-1)$$

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

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

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

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

$$12. \cos \theta = (0)$$

Find the exact principal value in radians:

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

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

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

$$16. \ \sec x = -\sqrt{2}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.6 Composition of Trig Values

Name: _____

Find the exact values of each expression using radicals or radians if necessary.

1. $\tan\left(\cos^{-1}\left(\frac{4}{5}\right)\right)$

2. $\cos\left(\arctan\left(\frac{4}{3}\right)\right)$

3. $\sin\left(\tan^{-1}\left(-\frac{5}{12}\right)\right)$

4. $\sec\left(\arcsin\left(-\frac{4}{7}\right)\right)$

5. $\sin^{-1}(\cos(0))$

6. $\arccos\left(\sin\left(\frac{\pi}{6}\right)\right)$

7. $\cos^{-1}\left(\sin\left(\frac{4\pi}{3}\right)\right)$

8. $\cot\left(\csc^{-1}\left(-\frac{5}{3}\right)\right)$

9. $\sin^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$

$$10. \tan^{-1}(\cos(\pi))$$

$$11. \tan^{-1}\left(\tan\left(-\frac{4\pi}{3}\right)\right)$$

$$12. \cos\left(\arcsin\left(-\frac{\sqrt{3}}{5}\right)\right)$$

$$13. \sin\left(\sec^{-1}\left(-\frac{4}{3}\right)\right)$$

$$14. \operatorname{arcsec}\left(\sec\left(-\frac{\pi}{3}\right)\right)$$

$$15. \sin^{-1}\left(\cot\left(\frac{3\pi}{4}\right)\right)$$

$$16. \tan\left(\operatorname{arcsec}\left(-\sqrt{2}\right)\right)$$

$$17. \sin\left(\sec^{-1}(-4)\right)$$

$$18. \sec\left(\csc^{-1}(-3)\right)$$

$$19. \csc\left(\cot^{-1}(2)\right)$$

$$20. \arcsin(\cos(\pi))$$

$$21. \tan\left(\sin^{-1}\left(-\frac{7}{5}\right)\right)$$

Name: _____

3.7 Compositions of Functions

Rewrite as an algebraic expression

1. $\cos(\sin^{-1} x)$

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

3. $\sin\left(\arctan \frac{1}{x}\right)$

4. $\csc(\tan^{-1} 3x)$

5. $\tan(\sec^{-1} 2x)$

6. $\cos\left(\arcsin \frac{x}{\sqrt{3}}\right)$

Find the exact value of the expression, if it's defined

7. $\sec\left(\sin^{-1} \frac{4}{5}\right)$

8. $\cos^{-1}(\sin \pi)$

9. $\sin^{-1}\left(\tan \frac{3\pi}{4}\right)$

10. $\cos^{-1}\left(\sin \frac{8\pi}{3}\right)$

11. $\tan\left(\cos^{-1} \frac{25}{7}\right)$

12. $\tan\left(\sec^{-1} \frac{13}{5}\right)$

13. $\arcsin\left(\cos \frac{7\pi}{6}\right)$

14. $\sin^{-1}\left(\cos \frac{-5\pi}{4}\right)$