

Write your questions and thoughts here!

RECALL:

How do we solve the following equations?

$x + 5 = 13$

$7x = 35$

$2^x = 24$

$\sin \theta = 1$

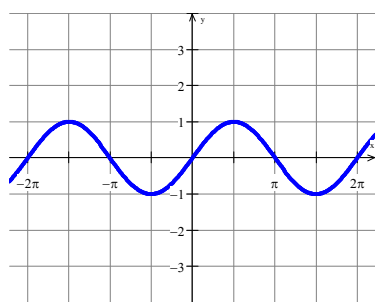
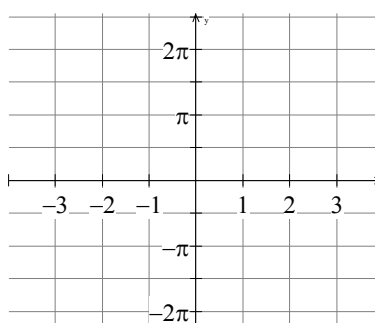
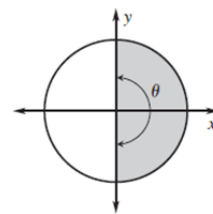
Arcsine: (Sine Inverse)

$\sin \theta = c$



$\sin^{-1} c =$

OR $\arcsin =$

Graph of $y = \sin \theta$ Graph of $\theta = \sin^{-1} c$ Values of θ used for arcsine:

Domain of arcsine:

Range of arcsine:

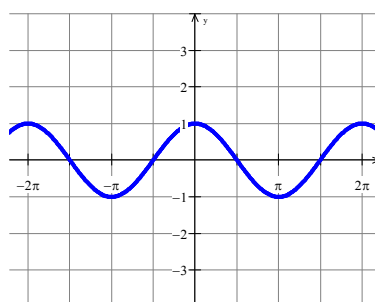
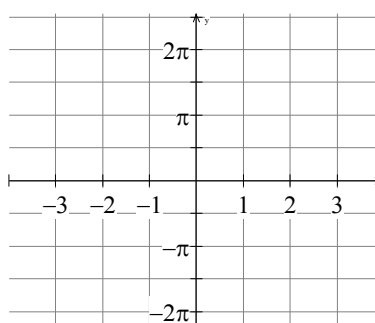
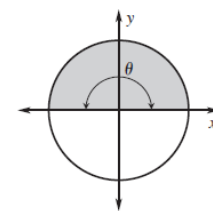
Arccosine: (Cosine Inverse)

$\cos \theta = c$



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

OR $\arccos c = \theta$

Graph of $y = \cos \theta$ Graph of $\theta = \cos^{-1} c$ Values of θ used for arccosine:

Domain of arccosine:

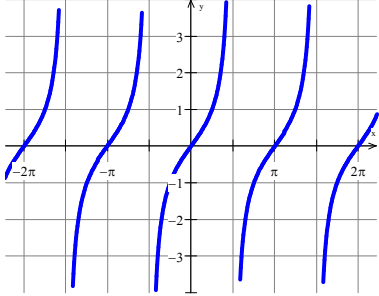
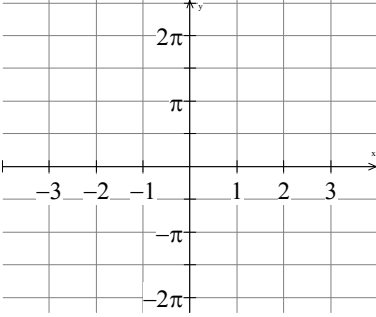
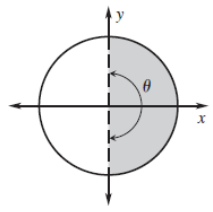
Range of arccosine:

10.4 Inverse Trig Functions

Write your questions and thoughts here!

Arctangent: (Tangent Inverse)

$$\tan \theta = c \quad \longrightarrow \quad \tan^{-1} c = \theta \quad \text{OR} \quad \arctan c = \theta$$

<p>Graph of $y = \tan \theta$</p> 	<p>Graph of $\theta = \tan^{-1} c$</p> 	<p>Values of θ used for arctangent:</p>  <p>Domain of arctangent:</p> <p>Range of arctangent:</p>
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Angle vs. two sides of a triangle

$$\sin(\theta) =$$

$$\csc(\theta) =$$

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

$$\csc^{-1}\left(\frac{\quad}{\quad}\right) =$$

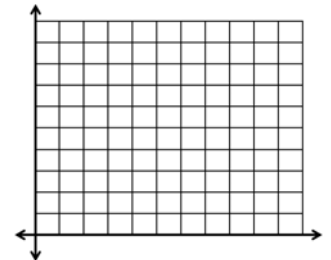
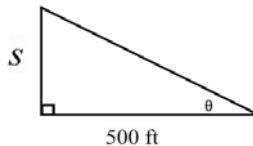
1) $\csc^{-1}(2.67) =$

2) $\sec(0.15) =$

3) Find the exact value of the expression WITHOUT the use of a calculator.
 $\tan\left(\arcsin\left(\frac{\sqrt{3}}{2}\right)\right)$.

4) Use a reference triangle to find the exact value of $\tan\left(\sin^{-1}\left(\frac{5}{13}\right)\right)$.

5) A photographer wants to photo a hot air balloon launch. Write an equation to model the angle θ of his camera as a function of the height s of the balloon.



Now summarize what you learned!

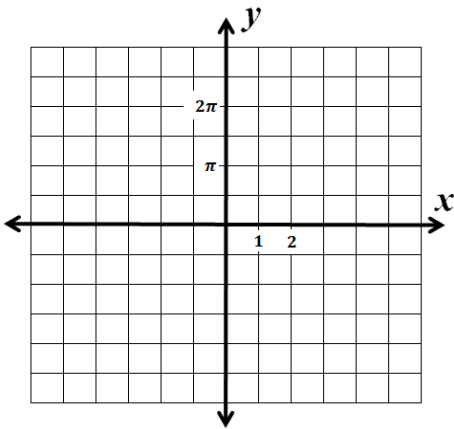
10.4 Practice – Inverse Trig Functions

Name: _____

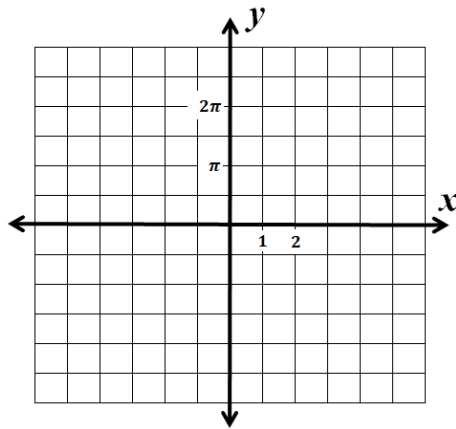
Pre-Calculus

For 1-9, graph the function.

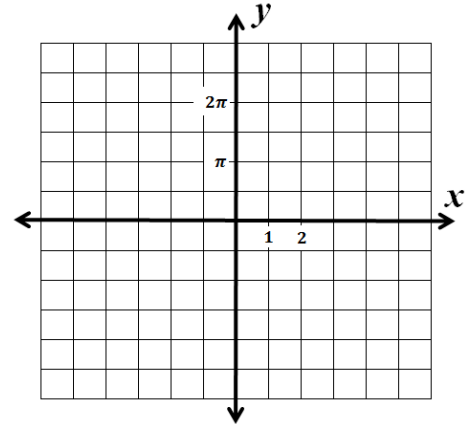
1) $y = 2 \sin^{-1} x$



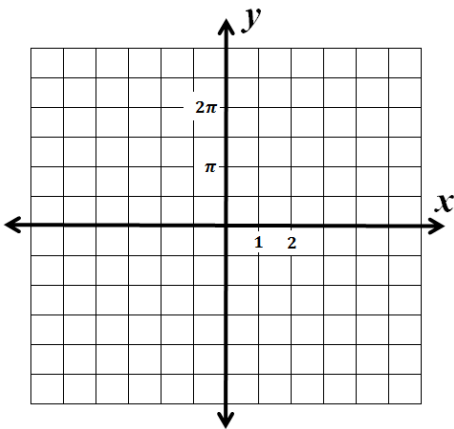
2) $y = \cos^{-1}(x + 3)$



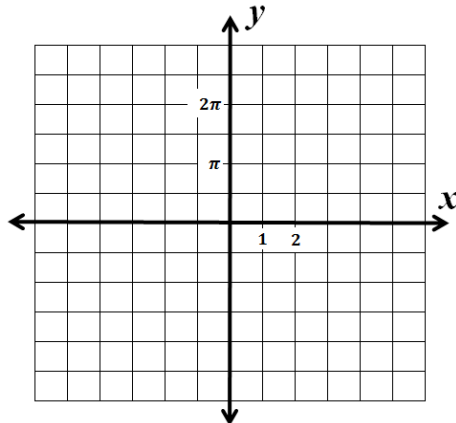
3) $y = \tan^{-1} x - \frac{3\pi}{2}$



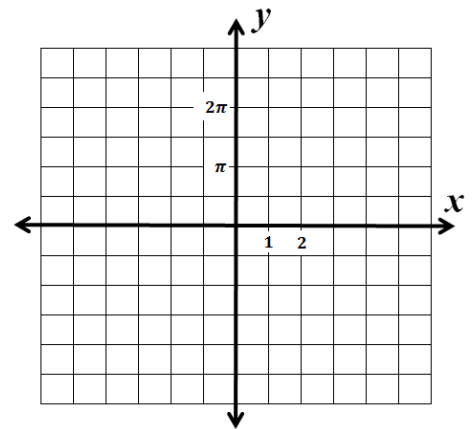
4) $y = \sin^{-1} x - \pi$



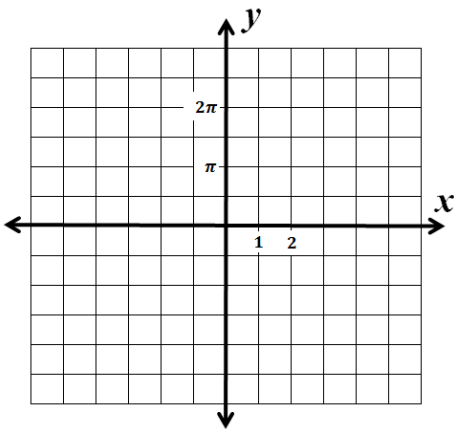
5) $y = \cos^{-1} \frac{x}{2}$



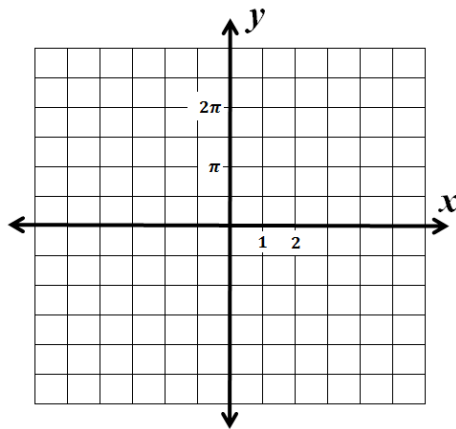
6) $y = 3 \tan^{-1} x + \pi$



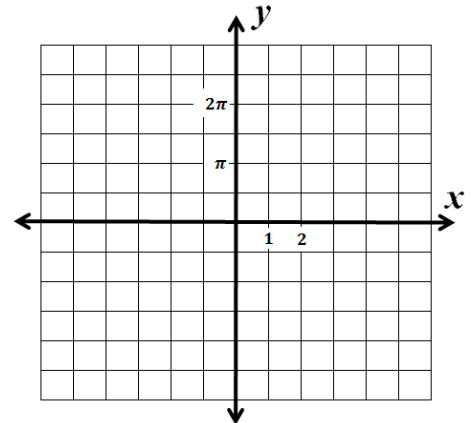
7) $y = 2 \cos^{-1} x - 2\pi$



8) $y = 2 \tan^{-1} x$



9) $y = 3 \sin^{-1}(x - 2) + \frac{\pi}{2}$



For 10-17, find the exact value of the expression. Do not use a calculator! (radians or degrees both work)

10) $\sin\left(\arcsin\left(\frac{1}{2}\right)\right)$

11) $\cos\left(\arcsin\left(\frac{1}{2}\right)\right)$

12) $\cos\left(\arccos\left(\frac{\sqrt{3}}{2}\right)\right)$

13) $\tan\left(\arcsin\left(\frac{\sqrt{3}}{2}\right)\right)$

14) $\sec(\arctan(-\sqrt{3}))$

15) $\sin(\operatorname{arccsc}(2))$

16) $\cos(\operatorname{arcsec}(\frac{2\sqrt{3}}{3}))$

17) $\csc(\arctan(1))$

For 18-25, find the approximate value of the expression by using a calculator. Round to three decimals. Only one answer is necessary. Assume degrees for inverse functions.

18) $\sin^{-1}(\frac{1}{2})$

19) $\csc(20^\circ)$

20) $\operatorname{arcsec}(2)$

21) $\sec(0.473)$

22) $\cot(\frac{9}{2})$

23) $\cot^{-1}(\frac{9}{2})$

24) $\operatorname{arccsc}(1.11)$

25) $\sec^{-1}(6)$

For 26-29, use a reference triangle to find the exact value of the expression.

26) $\tan(\sin^{-1}(\frac{5}{13}))$

27) $\sec(\operatorname{arccsc}(\frac{8}{6}))$

28) $\csc(\cot^{-1}(\frac{3}{2}))$

29) $\sec(\sin^{-1}(\frac{5}{7}))$

Skillz Review: Factor Out a Monomial (Undistribute)

$6x^2 - 15x$

$\cos^2 x - \cos x$

$2 \sin^3 x + 12 \sin^2 x - 6 \sin x$

Skillz Review: Factor out a Binomial (unFOIL)

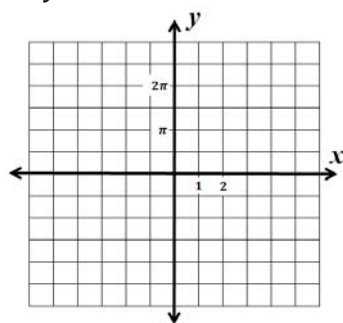
$3x^2 - x - 10$

$3 \sin^2 x - \sin x - 10$

$\cos^2 x + 8 \cos x + 7$

10.4 Application and Extension

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



2. Find the approximate value of the expression by using a calculator. Round to three decimals. Assume degrees for inverse functions.

a. $\csc^{-1}(2.5)$

b. $\csc(2.5)$

3. When an earthquake hits and creates a tsunami, the water first goes down from its normal level, and then rises an equal distance above its normal level, then returns to its normal level. A tsunami is approaching Trig Island and is modeled by:

$$d = 10 \sin \left[\frac{2\pi}{15} (t - 7.5) \right] + 11$$

where d = the water's depth in meters and t = time in minutes since the earthquake. This model only works for one cycle!

- Using the equation, what is the maximum height of the tsunami wave? (No calculator!)
- Using the equation, what is the normal depth of water at Trig Island? (No calculator!)
- What is the period of this function? What does this mean in the context of this problem?



- Graph in the calculator showing the depth of water from the moment the earthquake struck ($t = 0$) to 13 minutes later. Sketch the graph to the right.



- The Treasure of Trig Island lies 5 meters beneath the normal surface of the water. For how long with the Treasure of Trig Island be exposed? (Remember to look at your answer from part b.)

4. Superman and the Hulk are playing baseball. The Hulk throws a fast ball to Superman and it is hit straight up in the air. Hulk is standing 60.5 feet from Superman when the ball is hit. Assuming the ball never comes back down (remember...Superman just hit it), write a model that represents the angle of elevation (from Hulk's perspective) as a function of the height of the ball.