Honors Precalculus   Name: ____________________________________

Chapter 5 Notes

5.1 - Using Fundamental Identities

Use the fact that tan(x) = 1/3 and cos(x) < 0 to get the other 5 trig values.

$sinx =$ $cscx =$

$cosx =$ $secx =$

$tanx =$ $\cot x =$

Ex: Simplify by GCF factoring: $\cos^2 x \cdot cscx - cscx$

It's just like $3x^2y - 5xy$

Ex: Simplify by regular factoring.

$2\tan^2(\theta) + 7\tan(\theta) + 3$

$\sec^2 x + 3\tan x + 1$

Ex: Simplify by using a trig identity

$\sin x\,(\csc x - \sin x)$

Ex: Simplify by using a conjugate

$$\frac{\cos^2\theta}{1 - sin\theta}$$

5.2 Day 1 – Verifying Trig Identities

Guidelines for Verifying Trig Identities

1) Work one side at a time (typically the more complicated one) 2) Look for ways to simplify

3) Look to use trig identities 4) Try converting to just sines and cosines 5) Always try *something*

Verify $\frac{\sec^2 x - 1}{\sec^2 x} = \sin^2 x$

Verify $\frac{\sec^2 x - 1}{\sec^2 x} = \sin^2 x$ another way.

Verify the following.

$$2\csc^2 \beta = \frac{1}{1 - cos\beta} + \frac{1}{1 + cos\beta}$$

Verify the following by using identities.

$$(\sec^2 x - 1)(\sin^2 x - 1) = -sin^2 x$$

Verify the following by converting to sines and cosines.

$$cscx - sinx = cosx \cdot cotx$$

5.2 Day 2 - Verifying More Trig Identities Using Conjugates and Other Techniques

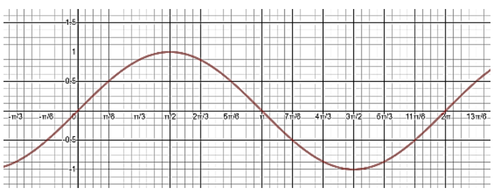
Verify using conjugates $$\csc x + \cot x = \frac{\sin x}{1 - \cos x}$$	Verify by working both sides $$\frac{\tan^2 \theta}{1 + sec\theta} = \frac{1 - cos\theta}{cos\theta}$$
Verify. $\frac{1+\sin x}{\cos x} + \frac{\cos x}{1+\sin x} = 2\sec x$	
YOYO #1 $$\sec x + \tan x = \frac{\cos x}{1 - \sin x}$$	YOYO #2 $$\frac{\tan\theta}{1 + \sec\theta} + \frac{1 + \sec\theta}{\tan\theta} = 2csc\theta$$

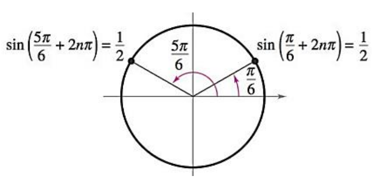
5.3 Day 1 – Solving Trig Equations

Solve for all solutions

$$2\sin x - 1 = 0$$

Why are there infinitely many solutions?





Solve by collecting like terms on the interval $[0, 2\pi)$

$$\cos x - \sqrt{2} = -\cos x$$

Solve for all solutions by taking a square root

$$3\tan^2 x - 1 = 0$$

Solve by GCF factoring on the interval $[0, 2\pi)$

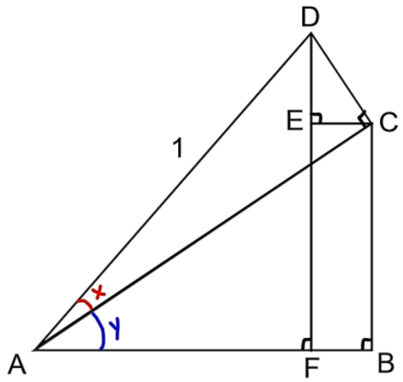
$$\cot x \cdot \sin^2 x = 2\cot x$$

5.3 Day 2 – Solving Quadratic and Other Trig Equations

Solve by factoring on the interval $[0, 2\pi)$ $2\sin^2 x - 3\sin x + 1 = 0$	Solve by factoring on the interval $[0, \pi)$ $3\sec^2 x - 2\tan^2 x - 4 = 0$
Solve by converting to a quadratic on the interval $[0, 2\pi)$ $\sin x + 1 = \cos x$	Solve for an altered period on the interval $[0, \pi)$ $2\sin 2t - \sqrt{3} = 0$

Proving Sine Sum Formula, Double Angle Formulas, and Power Reducing Formulas

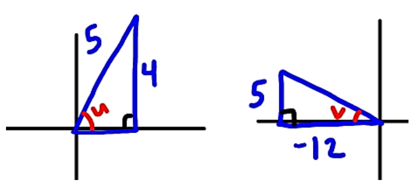
Goal: Prove $\sin(x + y) = \sin(x)\cos(y) + \cos(x)\sin(y)$



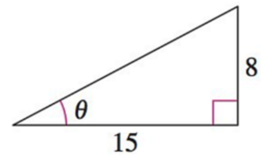
Goal: Prove the double-angle formulas $\sin(2u) =$ $\cos(2u) =$ $\tan(2u) =$	
Goal: Prove the power-reducing formulas for $\sin^2 u$ *and* $\cos^2 u$	Prove power-reducing for $\tan^2 u$

5.4 - Applying the Sum and Difference Formulas

Use the sum and difference formulas to find the values of the first two and prove the last two identities

<table>
<tr><td colspan="2">$\sin(75°)$</td></tr>
<tr><td colspan="2">$\cos(\pi/12)$</td></tr>
<tr><td>$\sin\left(x - \frac{\pi}{2}\right) = -\cos x$</td><td>$\tan(\theta + 3\pi) = \tan(\theta)$</td></tr>
<tr><td>Given the angles shown, find sin(u + v).

</td><td>Find both solutions on the interval [0, 2π).
$$\sin\left(x + \frac{\pi}{2}\right) + sin\left(x - \frac{3\pi}{2}\right) = 1$$</td></tr>
</table>

5.5 - Double Angle, Half Angle, and Power Reducing Formulas

Use a half-angle formula to find the exact value of $\cos(75°)$	Use the following figure and the double-angle formulas to find $\sin(2\theta)$, $\cos(2\theta)$, and $\tan(2\theta)$. 
YOYO: Use a half-angle formula to find the exact value of $\sin\left(\frac{\pi}{8}\right)$.	Rewrite the following so all the trig functions are of the first power. $\cos^4(x)$