CHAPTER 7

Section 7.1 Notes

Objectives:

- Identify and use the reciprocal identities, quotient identities, Pythagorean identities, symmetry identities, and opposite-angle identities.

Example 1:
Prove that $\sin x \cos x = \tan x$ is NOT a trigonometric identity by producing a counterexample.

Check it out!!!!!! Look on your "Formula" Sheet and find the following identities:		
Reciprocal Identities	Quotient Identities	Pythagorean Identites

Example 2:
Use the information to find the trigonometric value:

a. If $\sec x = \frac{3}{2}$, find cos x.

b. If $\csc x = \frac{4}{3}$, find tan x.

Example 3:
Express each value as a trig function of an angle in Quadrant I (Reference angle).

a. sin 600

b. $\sin \frac{19\pi}{4}$

c. cos(-410)

d. $\tan \frac{37\pi}{6}$

Check it out!!!!!! Look on your "Formula" Sheet and find the following identities:

<u>Opposite Angle Identities</u>

<u>Example 4:</u>

Simplify: $\sin x + \sin x \cot^2 x$

Section 7.2 (Day 1)

Objectives:

- Use the basic trig identities to verify other identities.

Example 1:

Prove that $\sec^2 x - \tan x \cot x = \tan^2 x$ is an identity (both sides are equal).

What is the domain of the identity?

Example 2:

Prove that $\frac{\sin A}{\csc A} + \frac{\cos A}{\sec A} = \csc^2 A - \cot^2 A$ is an identity.

State the domain of the identity.

<u>Section 7.2 (Day 2):</u>

Objective:

- Find numerical values of trig functions.

<u>Example 1:</u>

Use trig. identities to prove: $\frac{\cos(A+360)}{\cos(360-A)} = \cos A \sec A$. State the domain of the identity.

<u>Example 2:</u>

Find a numerical value of one trigonometric function of x if $\frac{\cot x}{\cos x} = 2$.

Mixed Review:

1. State if the following is an identity or not. If not, give a counterexample. If so, prove it.

   a. $(\cos x + \sin x)^2 = \cos^2 x + \sin^2 x$

   b. $\cos x \tan x = \sin x$

2. Prove: $1 + \tan^2 x = \sec^2 x$ and state the domain of the function.

3. If $\csc x = \frac{-5}{4}$ in the third quadrant, find $\tan x$.

Section 7.3/7.4 Notes

Objectives:

- Use the sum and difference identities for the sine, cosine, and tangent functions.

Check it out!!!!!! Look on your "Formula" Sheet and find the following identities:

Difference of cosines   Sum of cosines   Difference of sines   Sum of sines

Example 1:

Use the sum or difference identity to find the EXACT VALUE of cos 735º.

Example 3:

Use the sum or difference identity to find the EXACT VALUE of $\sin \frac{7\pi}{12}$.

Example 4:

Find the value of sin $(x - y)$ if $0 < x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$, $\sin x = \frac{9}{41}$, and $\sin y = \frac{7}{25}$.

Try these with your partner:

1. Use the sum or difference identity to find an EXACT value of cos 75°.

2. Find the value of sin $(x + y)$ if $0 < x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$, $\sin x = \frac{4}{5}$, and $\cos y = \frac{5}{13}$.

3. Verify that $\sec(\pi + A) = -\sec A$ is an identity.

Section 7.4 Notes

Objectives:

- Use the double angle identity for the sine and cosine functions.

Check it out!!!!!! Look on your "Formula" Sheet and find the following identity:

Double Angle Identities

Example 1:

If $\sin x = \frac{2}{3}$, and x has its terminal side in the **first quadrant**, find the EXACT value of each function.

a. $\sin 2x$

b. cos 2x

<u>Section 7.5 Notes</u>

Objectives:
- Solve trigonometric equations and inequalities.

Recall the range of the functions: $\cos^{-1}x$, $\sin^{-1}x$, and $\tan^{-1}x$. In which quadrants are each of those functions defined?

The answers in the quadrants above are called the **principal values** of the trig functions.

<u>Example 1:</u>

Solve $\sin x \cos x - \frac{1}{2}\cos x = 0$ for principal values of x. Express your solutions in degrees and radians.

<u>Example 2:</u>
a. Solve $\cos^2 x - \cos x + 1 = \sin^2 x$ for $0 \le x < 2\pi$.

b. What would your solution be over the set of all real numbers?

Example 3:

Solve $2\sec^2 x - \tan^4 x = -1$ for all real values of x.

Example 4:

Solve $2\sin x + 1 > 0$ for $0 \le x < 2\pi$.

Chapter 7 Formula Sheet

Reciprocal Identities

$$\csc x = \frac{1}{\sin x}$$
$$\sec x = \frac{1}{\cos x}$$
$$\cot x = \frac{1}{\tan x}$$

Quotient Identities

$$\tan x = \frac{\sin x}{\cos x}$$

$$\cot x = \frac{\cos x}{\sin x}$$

Opposite Angle Identities

$$\sin(-x) = -\sin x$$

$$\cos(-x) = \cos x$$

Pythagorean Identities

$$\sin^2 x + \cos^2 x = 1$$
$$\tan^2 x + 1 = \sec^2 x$$
$$\cot^2 x + 1 = \csc^2 x$$

Sum and Difference Identities

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$
$$\sin(x - y) = \sin x \cos y - \cos x \sin y$$
$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$
$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

Double-Angle Identities

$$\sin 2x = 2\sin x \cos x$$
$$\cos 2x = \cos^2 x - \sin^2 x$$
$$\cos 2x = 1 - 2\sin^2 x$$
$$\cos 2x = 2\cos^2 x - 1$$

Symmetry Identities

$$\sin(x + 360) = \sin x$$
$$\cos(x + 360) = \cos x$$
$$\sin(x + 180(2k - 1)) = -\sin x$$
$$\cos(x + 180(2k - 1)) = -\cos x$$

$$\sin(360 - x) = -\sin x$$
$$\cos(360 - x) = \cos x$$
$$\sin(180(2k - 1) - x) = \sin x$$
$$\cos(180(2k - 1) - x) = -\cos x$$