3-4 Notes Properties of the Trig Functions Name _____
Pre-Calculus

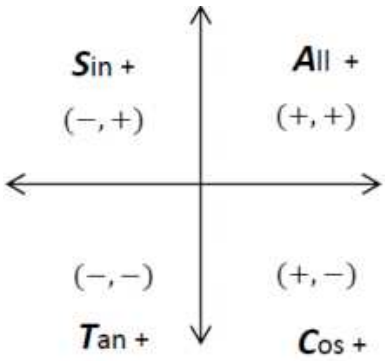
I. Coterminal Angles – angles that share the same terminal side
Find the exact value of a trig function and graph.

1. sin $\frac{17\pi}{4}$ 2. cos 5π 3. tan $\frac{5\pi}{4}$

II. Signs of the Trig Functions

Looking at the Cartesian Plane remember the signs of x and y in each of the quadrants. Superimpose this with the location of t, and you can determine the appropriate sign for each trig function.

To remember where each function is positive –
All **S**tudents **T**ake **C**alculus



4. If sin θ < 0 and cos θ < 0, in which quadrant does θ lie?

5. Find the sign of the expression if the terminal point is determined by t in the given quadrant. cos t • sin t , quadrant II

III. Fundament Trig Identities

In mathematics, trigonometric identities are equalities that involve trigonometric functions and are true for every single value of the occurring variables. The relationship between our basic trig functions and their reciprocals are the **Reciprocal Identities** we also need to know a couple other important identities.

Reciprocal Identities

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

Quotient Identities

$$tan\theta = \frac{sin\theta}{cos\theta} \qquad cot\theta = \frac{cos\theta}{sin\theta}$$

Pythagorean Identities

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

A. Find exact values using identities

1. Given sin θ = $\frac{\sqrt{5}}{5}$ and cos = $\frac{2\sqrt{5}}{5}$, find the exact values of the four remaining trig functions of θ using identities.

Find the exact values of each expression, do NOT use a calculator.

2. $\tan 20° - \frac{\sin 20°}{\cos 20°}$

3. $\sin^2(\frac{\pi}{12}) + \frac{1}{sec^2\frac{\pi}{12}}$

4. Given that $\sin\theta = 1/3$ and $\cos\theta < 0$, find the exact value of each of the remaining five trig functions.

5. Given that $\tan\theta = ½$ and $\sin\theta < 0$, find the exact value for each of the remaining five trig functions.

IV. Even/Odd Properties of Trig Functions

→ Recall: A function is even if $f(-\theta) = f(\theta)$ & a function is odd if $f(-\theta) = -f(\theta)$.

Even/Odd Properties

$$\sin(-\theta) = -\sin\theta \qquad \cos(-\theta) = \cos\theta \qquad \tan(-\theta) = -\tan\theta$$
$$\csc(-\theta) = -\csc\theta \qquad \sec(-\theta) = \sec\theta \qquad \cot(-\theta) = -\cot\theta$$

Find the exact values of the following.

1. $\sin -45°$

2. $\cos -\pi$

3. $\cot -\frac{3\pi}{2}$

4. $\tan -\frac{37\pi}{2}$