Trigonometry Review

W-up: A) $\sin\frac{\pi}{2}$ B) $\cos\frac{5\pi}{6}$ C) $\tan(-\pi)$

Trigonometric Function Definitions

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \csc\theta = \frac{\text{hypotenuse}}{\text{opposite}} \qquad \sin\theta = \frac{y}{1} = y \qquad \csc\theta = \frac{1}{y}$$

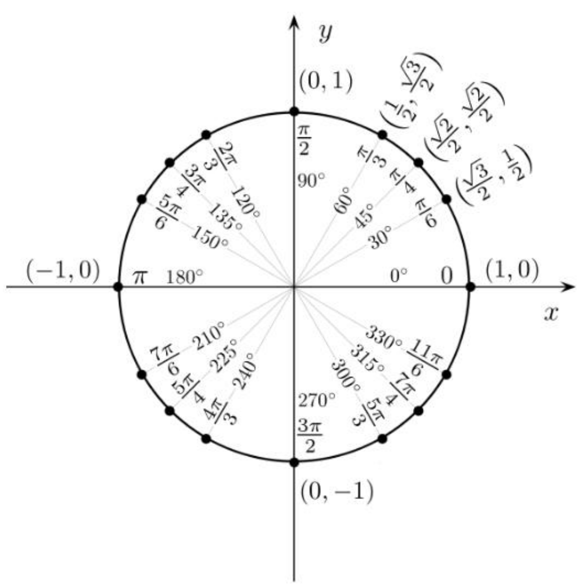
$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \sec\theta = \frac{\text{hypotenuse}}{\text{adjacent}} \qquad \cos\theta = \frac{x}{1} = x \qquad \sec\theta = \frac{1}{x}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} \qquad \cot\theta = \frac{\text{adjacent}}{\text{opposite}} \qquad \tan\theta = \frac{y}{x} \qquad \cot\theta = \frac{x}{y}$$

So… $\tan\theta = \frac{\sin\theta}{\cos\theta}$ and $\cot\theta = \frac{\cos\theta}{\sin\theta}$ and these are IMPORTANT identities to know!

Evaluating Trig. Functions

Use the x-coordinate, y-coordinate or the division of both from the unit circle to evaluate trig functions using the unit circle.



Note: The coordinates on the unit circle are exactly the same(with the possible exception of the sign) at ANY ANGLE stopping(terminal side) that distance(degree or radian) away from the *x*-axis (this is called the reference angle).

EX) $\sin\frac{5\pi}{6}=$ EX) $\cos\left(\frac{\pi}{4}\right)=$ EX) $\sec\left(\frac{\pi}{4}\right)=$ EX) $\cot\frac{\pi}{3}=$

BASIC IDENTITIES TO MEMORIZE!

Pythagorean Identities

$$\sin^2 A+\cos^2 A=1$$

$$\sec^2 A-\tan^2 A=1$$

$$\csc^2 A-\cot^2 A=1$$

Double –Angle Formulas

$$\sin 2A=2\sin A\cos A$$

$$\cos 2A=\cos^2 A-\sin^2 A$$

$$\text{or } 2\cos^2 A-1$$

$$\text{or } 1-2\sin^2 A$$

Solving Equations Containing Trigonometric Functions

One trig. function involved: Isolate trig function and solve algebraically (remember there generally is more than one answer from 0 to 2π)

SOLVE each equation for $0<x\leq 2\pi$

EX) $\sin x=\frac{1}{2}$ EX) $2\sin^2 x=1$ EX) $\tan x+3=3$

Two or more trig. function involved: **Use identities** to write as one

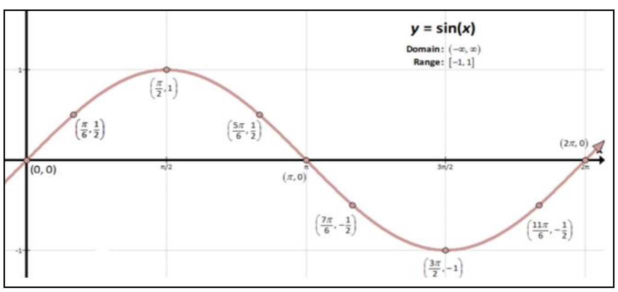
AND/OR

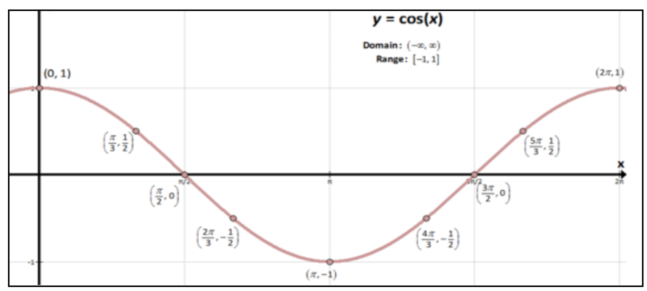
Factor to create a product set equal to zero

SOLVE each equation for $0 < x \le 2\pi$

EX) $2\sin^2 x - \sin x = 1$ EX) $\cos x - \sin x = 0$ EX) $2\cos^2 x + \sin x = 1$

Graphing(only basic characteristics needed)





Note: To graph the reciprocal functions place **asymptotes** where the *x*-interecepts occur (SINCE THIS IS WHERE THE ORIGINAL FUNCTION EQUALS *ZERO*) and USE RECIPROCAL VALUES.

EX) Graph each function

A) $y = 3\sin x$ B) $y = -\cos x$ C) $y = \sec x$

Inverses

Notation: $\text{Sin}^{-1}x$ or $\text{Arcsin}\ x$ means inverse sine("the angle whose sine is x")

So…you are **given the value**(answer to the trig function) and asked "what angle applied to the original trig function gives me that value"

NOTE: VERY IMPORTANT

Inverses can only exist provided the domain of the original trig. functions(which are angles) are restricted ALLOWING FOR ONLY ONE POSSIBLE ANSWER.

Thus, the range of the inverses must be as follows:

$-\frac{\pi}{2} \le \text{Sin}^{-1}x \le \frac{\pi}{2}$ $\qquad$ $0 \le \text{Cos}^{-1}x \le \pi$ $\qquad$ $-\frac{\pi}{2} < \text{Tan}^{-1}x < \frac{\pi}{2}$

EX) $\text{Arcsin}\frac{\sqrt{3}}{2} =$ $\qquad$ EX) $\text{Arccos}\ 0 =$ $\qquad$ EX) $\text{Tan}^{-1}\left(-1\right) =$ $\qquad$ EX) $\text{Cos}^{-1}\left(-\frac{1}{2}\right) =$