Trigonometry Review

W-up: $\sin\theta = \frac{\sqrt{3}}{2}$

Trigonometric Function Definitions

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

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

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

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

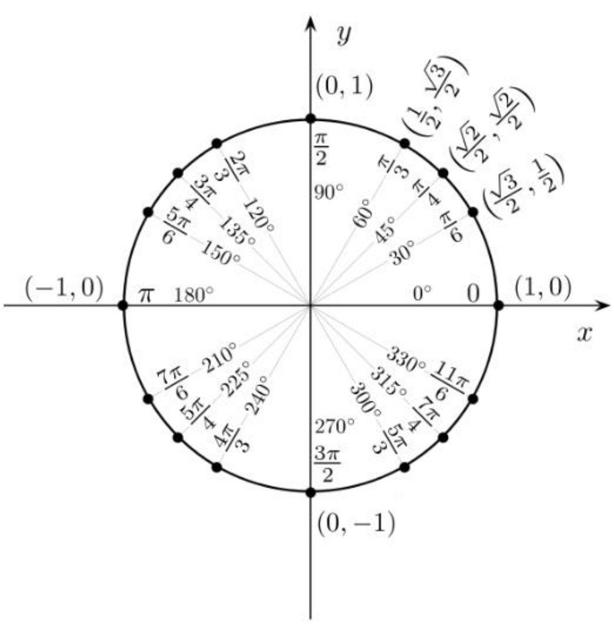
$$\cos\theta = \frac{x}{1} = x \qquad \sec\theta = \frac{1}{x}$$

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

So… $\tan\theta = \frac{\sin\theta}{\cos\theta}$ and $\cot\theta = \frac{\cos\theta}{\sin\theta}$

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.



EX) $\sin\frac{5\pi}{6} =$ EX) $\sec(-\pi) =$ EX) $\tan\left(\frac{11\pi}{2}\right) =$ EX) $\cot\frac{\pi}{3} =$

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).

Coterminal Angles: angles with the same terminal side, thus same trigononmetric value

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

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

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

or $2\cos^2 A - 1$

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) $2\sin x = \frac{1}{2}$

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

OR

Algebraically create a product set equal to zero

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

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

Inverses

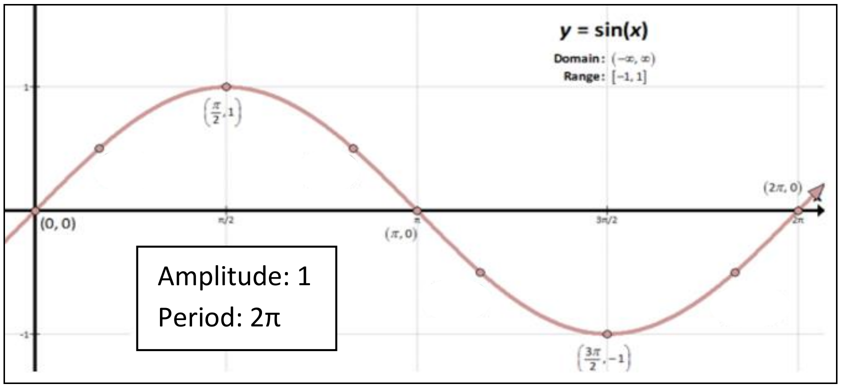
Notation: $\text{Sin}^{-1}x$ or $\text{Arcsin } x$ means inverse sine("the angle whose sine is x")

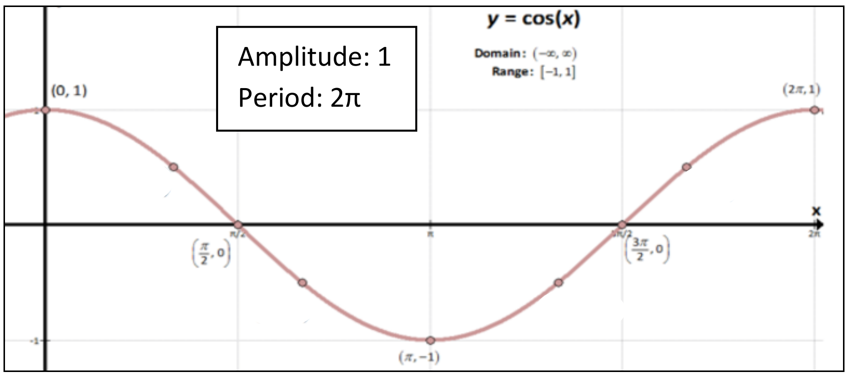
Inverses can only exist provided the domain of the original trig. functions(which are angles) are restricted. Thus, the range of the inverses must be as follows:

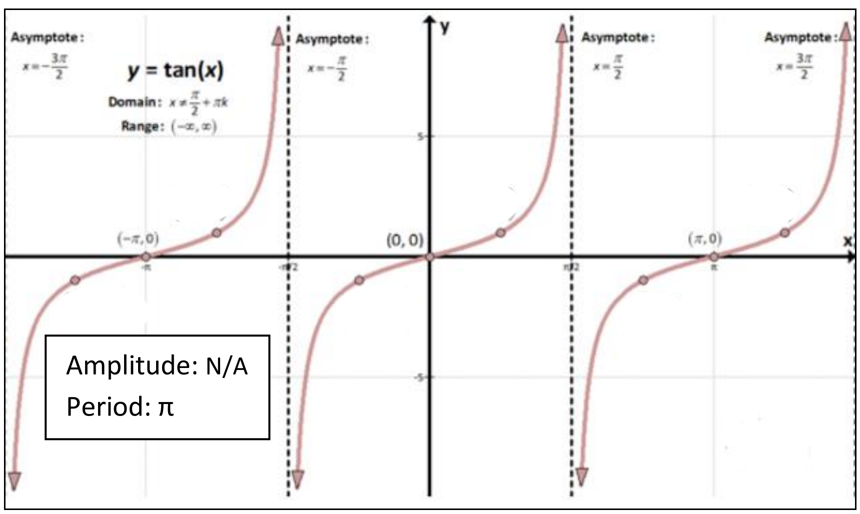
$-\frac{\pi}{2} \leq \text{Sin}^{-1}x \leq \frac{\pi}{2}$ $0 \leq \text{Cos}^{-1}x \leq \pi$ $-\frac{\pi}{2} < \text{Tan}^{-1}x < \frac{\pi}{2}$

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

Graphing







Note: To graph the reciprocal functions place asymptotes where the *x*-interecepts occur and reflect upward/downward from the min and max.

EX) Graph each function

A) $y=3\sin x$

B) $y=-2\sec(x)$

C) $y=3\cot x$