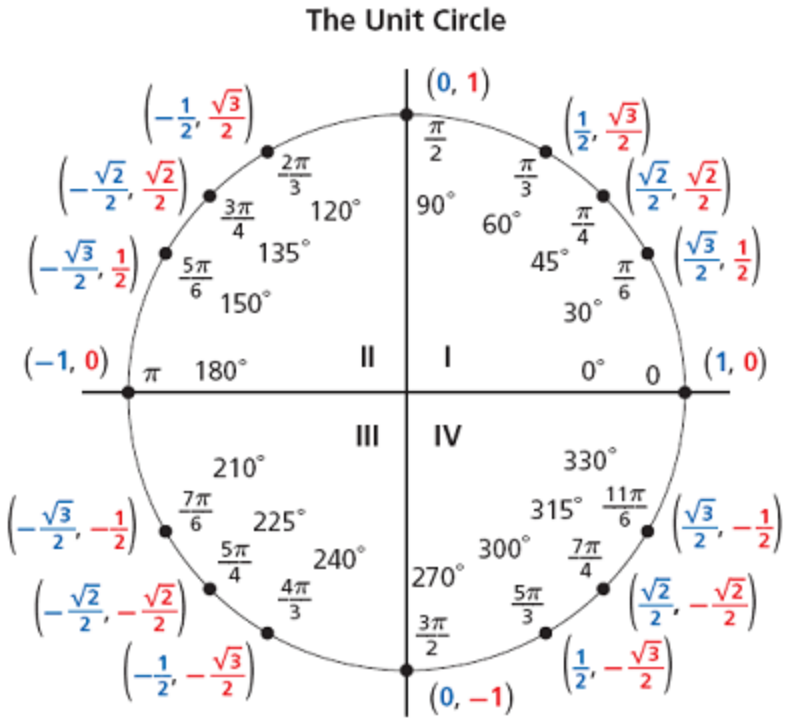
Section 5.1 Fundamental Identities

Even/Odd Identities

OR **Negative Angle Identities**



EVEN FUNCTIONS

A function is **even** if $f(-x) = f(x)$ for all x in the domain of x. The graphs of even functions are symmetric about the y-axis.

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

ODD FUNCTIONS

A function is **odd** if $f(-x) = -f(x)$ for all x in the domain of x. The graphs of odd functions are symmetric about the origin.

$\sin(-x) = -\sin x$ $\tan(-\theta) = -\tan\theta$ $\csc(-\theta) = -\csc\theta$ $\cot(-\theta) = -\cot\theta$

Example:

a) If $\tan\theta = 2.6$, then $\tan(-\theta) =$ _____

b) Find $\cos\left(-\frac{2\pi}{3}\right)$

c) Find $\sin\left(-\frac{2\pi}{3}\right)$

Fundamental Identities MEMORIZE!!

Reciprocal Identities

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

Quotient Identities

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

Pythagorean Identities

$\boldsymbol{\sin^2\theta + \cos^2\theta = 1}$ $\boldsymbol{\tan^2\theta + 1 = \sec^2\theta}$ $\boldsymbol{1 + \cot^2\theta = \csc^2\theta}$

Alternative Forms of the Pythagorean Identities

$\boldsymbol{\sin^2\theta} = 1 - \cos^2\theta$ $\boldsymbol{\tan^2\theta} = \sec^2\theta - 1$ $\boldsymbol{\cot^2\theta} = \csc^2\theta - 1$

$\boldsymbol{\cos^2\theta} = 1 - \sin^2\theta$ $\boldsymbol{\sec^2\theta}$ $= \tan^2\theta + 1$ $\boldsymbol{\csc^2\theta} = 1 + \cot^2\theta$

Negative Angle Identities

$\cos(-\theta) = \cos\theta$ $\sin(-\theta) = -\sin\theta$ $\tan(-\theta) = -\tan\theta$

$\sec(-\theta) = \sec\theta$ $\csc(-\theta) = -\csc\theta$ $\cot(-\theta) = -\cot\theta$

Concept Review

Multiplying

a) $\cos\theta\,(\cos\theta - \sin\theta + 2)$

b) $(2\sin\theta - \cos\theta)(3\sin\theta + 4)$

c) $(2\sin\theta - 1)^2$

d) $(\tan\theta - \sec\theta)(\tan\theta + \sec\theta)$

Factoring

a) $\sin\alpha\cos\alpha - \sin\alpha\sec\alpha$

b) $\sin^2\theta - 1$

c) $4\tan^2\beta + \tan\beta - 3$

d) $\cos^4 x + 2\cos^2 x + 1$

e) $\sin^4 x - \tan^4 x$