Trigonometric Functions Review (Chapter 6)

6.1 Angles

Angles: parts, positions, quadrants, types

Angle measurement in degrees: degrees/minutes/seconds & decimal degrees

Angle measurement in radians; converting degrees to/from radians

6.2 Trigonometric Functions of Angles

Definitions of trigonometric functions, for an acute angle of a right triangle

"SOH CAH TOA" mnemonic

A. Special Right Triangles

Fundamental Identities: reciprocal; tangent / cotangent; Pythagorean

B. Unit Circle (chart) [shows values for special angles]

C. Summary of Features of the Trigonometric Functions (chart)

Definitions of trigonometric functions of *any* angle

Signs of the functions by quadrant (table) [& mnemonic "A Smart Trig Class"]

6.3 Trigonometric Functions of Real Numbers

Definitions of trigonometric functions of real numbers

Geometric interpretation

Periodic functions

D. Sine, cosine, & tangent graphs

Formulas for negatives

Even & Odd trigonometric functions

6.4 Values of the Trigonometric Functions

E. Reference angles in each quadrant

F. Signs of trigonometric functions by quadrant (table) [& mnemonic]

G. Finding angles with a calculator (via the inverse functions)

6.5 Trigonometric Graphs

General Equations of sine & cosine variants: $y = a \sin(bx + c)$ and $y = a \cos(bx + c)$

a, b, c related to amplitude, period, phase shift

6.7 Applied Problems

Solving a triangle

Angle of elevation; angle of depression

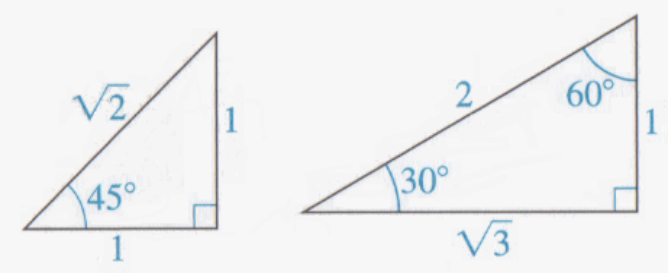
Directions (bearings) in navigation & surveying

Directions (bearings) in air navigation

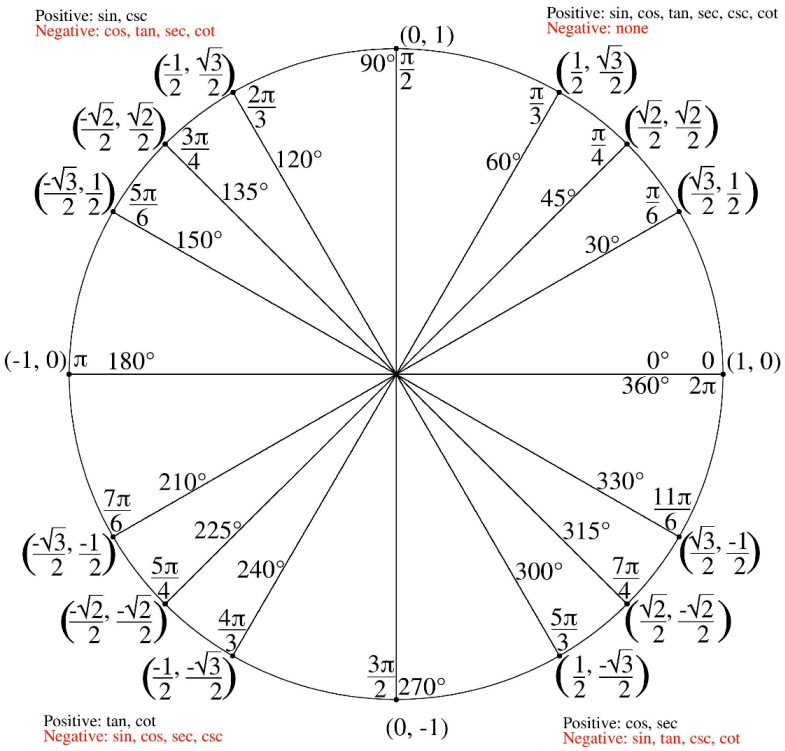
A. Special Right Triangles

The 45–45–90° triangle is constructed by slicing a square along its diagonal.

The 30–60–90° triangle is constructed by slicing an equilateral triangle down the middle.



B. Unit Circle chart (with special angles)

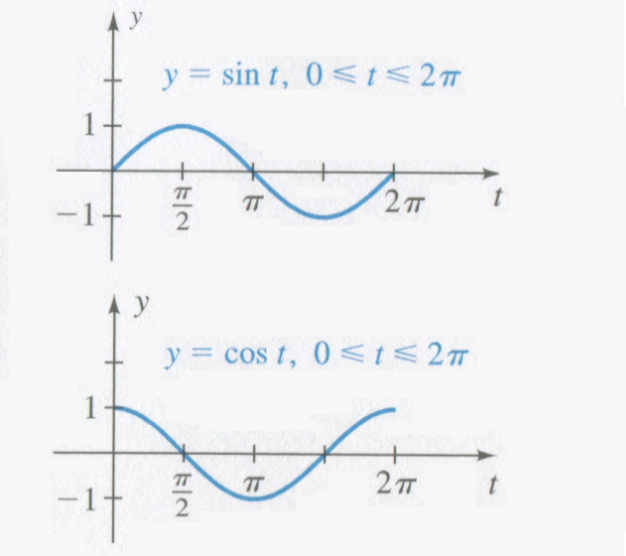


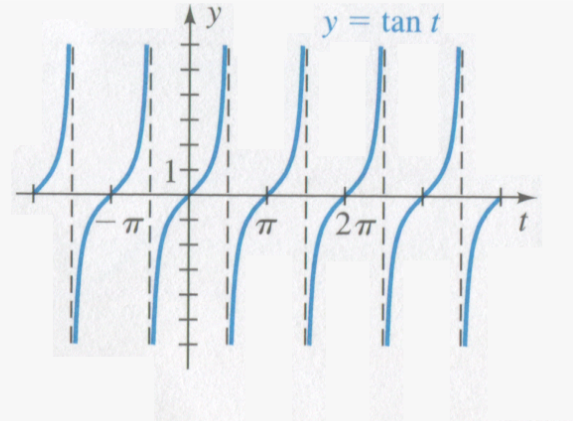
C. Summary of Features of the Trigonometric Functions

Feature	$y = \sin x$	$y = \cos x$	$y = \tan x$	$y = \cot x$	$y = \sec x$	$y = \csc x$
Domain	**R**	**R**	$x \neq \frac{\pi}{2} + \pi n$	$x \neq \pi n$	$x \neq \frac{\pi}{2} + \pi n$	$x \neq \pi n$
Vertical asymptotes	none	none	$x = \frac{\pi}{2} + \pi n$	$x = \pi n$	$x = \frac{\pi}{2} + \pi n$	$x = \pi n$
Range	[-1, 1]	[-1, 1]	**R**	**R**	$(-\infty,-1] \cup [1,\infty)$	$(-\infty,-1] \cup [1,\infty)$
x-intercepts	πn	$\frac{\pi}{2} + \pi n$	πn	$\frac{\pi}{2} + \pi n$	none	none
y-intercept	0	1	0	none	1	none
Period	2π	2π	π	π	2π	2π
Even or odd	odd	even	odd	odd	even	odd
Symmetry	origin	y-axis	origin	origin	y-axis	origin

(from Swokowski & Cole, p. 388)

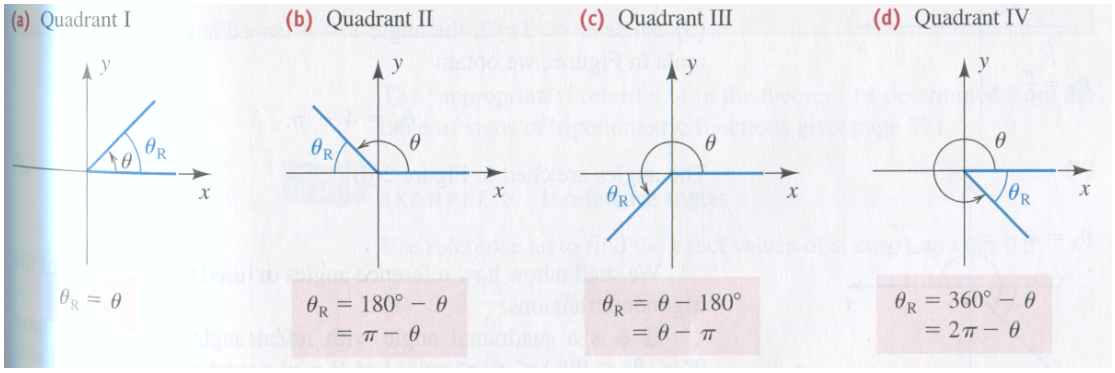
D. Sine, cosine, & tangent graphs





E. Reference angles in each quadrant

With $0° < \theta < 360°$ or $0 < \theta < 2\pi$:



If θ is greater than 360° or less than 0°, first find the coterminal angle θ with $0° < \theta < 360°$ or $0 < \theta < 2\pi$.

F. Signs of Trigonometric Functions

Functions that have *positive* values in each quadrant are shown.

II **S**in, csc	I **A**LL
III **T**an, cot	IV **C**os, sec

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Mnemonic: "A Smart Trig Class" = All, Sin, Tan, Cos. (Functions and their reciprocals always have the same sign, so the mnemonic ignores the reciprocals.)

G. Finding angles with a calculator (via the inverse functions)

Equation	*Values of k*	*Calculator solution*	*Interval containing θ if calculator is used (in radians, in degrees)*
$\sin\theta = k$	$-1 \le k \le 1$	$\theta = \sin^{-1} k$	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$, or $-90° \le \theta \le 90°$
$\cos\theta = k$	$-1 \le k \le 1$	$\theta = \cos^{-1} k$	$0 \le \theta \le \pi$, or $-0° \le \theta \le 180°$
$\tan\theta = k$	any k	$\theta = \tan^{-1} k$	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$, or $-90° \le \theta \le 90°$

(from Swokowski & Cole, p. 397) DAB, April 2011