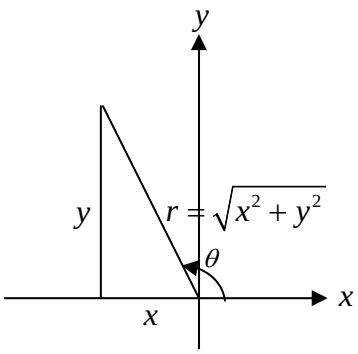
1.3 Definitions of the Trigonometric Functions

$\sin\theta = \frac{y}{r}$ $\quad \csc\theta = \frac{r}{y}$

$\cos\theta = \frac{x}{r}$ $\quad \sec\theta = \frac{r}{x}$

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



2.1 Trigonometric Functions of Acute Angles in Right Triangles

$\sin A = \frac{opposite}{hypotenuse}$

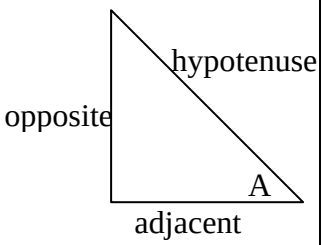
$\cos A = \frac{adjacent}{hypotenuse}$

$\tan A = \frac{opposite}{adjacent}$

$\csc A = \frac{hypotenuse}{opposite}$

$\sec A = \frac{hypotenuse}{adjacent}$

$\cot A = \frac{adjacent}{opposite}$



2.1, 2.2, 3.1 Trigonometric Function Values for Special Angles

Angle θ							
Degrees	Radians	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\cot\theta$	$\sec\theta$	$\csc\theta$
0°	0	0	1	0	undefined	1	undefined
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
90°	$\frac{\pi}{2}$	1	0	undefined	0	undefined	1
120°	$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\sqrt{3}$	$-\frac{\sqrt{3}}{3}$	-2	$\frac{2\sqrt{3}}{3}$
180°	π	0	-1	0	undefined	-1	undefined
225°	$\frac{5\pi}{4}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	1	1	$-\sqrt{2}$	$-\sqrt{2}$
270°	$\frac{3\pi}{2}$	-1	0	undefined	0	undefined	-1
330°	$\frac{11\pi}{6}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{3}$	$-\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	-2
360°	2π	0	1	0	undefined	1	undefined

1.4 Fundamental Identities

Reciprocal Identities

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

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

Pythagorean Identities

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

$$\tan^2\theta + 1 = \sec^2\theta$$

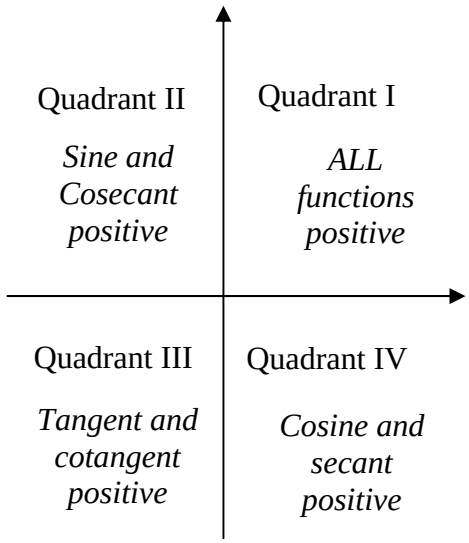
$$1 + \cot^2\theta = \csc^2\theta$$

Quotient Identities

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

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

Signs of Trigonometric Functions



2.1 Cofunction Identities

For any acute angle A,

$\sin A = \cos(90^\circ - A)$ $\quad \csc A = \sec(90^\circ - A)$ $\quad \tan A = \cot(90^\circ - A)$

$\cos A = \sin(90^\circ - A)$ $\quad \sec A = \csc(90^\circ - A)$ $\quad \cot A = \tan(90^\circ - A)$

3.1 Conversion of Angle Measures

Degree/Radian Relationship: $180^\circ = \pi$ radians

Conversion Formulas:

From	To	Multiply by
Radians	Degrees	$\frac{180^\circ}{\pi}$
Degrees	Radians	$\frac{\pi}{180^\circ}$

3.2 Applications of Radian Measure

Arc Length: $s = r\theta$, θ in radians

Area of Sector: $A = \frac{1}{2}r^2\theta$, θ in radians

3.4

Angular Velocity	Linear Velocity
$\omega = \frac{\theta}{t}$ (ω in radians per unit time, θ in radians)	$v = \frac{s}{t}$ $v = \frac{r\theta}{t}$ $v = r\omega$