UNIT CIRCLE

$-\sqrt{3}\left(\dfrac{-1}{2},\dfrac{\sqrt{3}}{2}\right)$ **(0, 1)** undefined $\left(\dfrac{1}{2},\dfrac{\sqrt{3}}{2}\right)\sqrt{3}$

$-1\left(\dfrac{-\sqrt{2}}{2},\dfrac{\sqrt{2}}{2}\right)$ 90°   120°   60° $\left(\dfrac{\sqrt{2}}{2},\dfrac{\sqrt{2}}{2}\right)$ 1

135° $\dfrac{\pi}{2}$ 45°

$-\dfrac{\sqrt{3}}{3}\left(\dfrac{-\sqrt{3}}{2},\dfrac{1}{2}\right)$ $\dfrac{2\pi}{3}$ $\dfrac{\pi}{3}$ $\dfrac{\pi}{4}$ $\dfrac{\pi}{6}$ 30° $\left(\dfrac{\sqrt{3}}{2},\dfrac{1}{2}\right)\dfrac{\sqrt{3}}{3}$

150° $\dfrac{3\pi}{4}$ $\dfrac{5\pi}{6}$

0 **(-1, 0)**   180° π 2π 0°   **(1, 0)** 0

360°

$\dfrac{\sqrt{3}}{3}\left(\dfrac{-\sqrt{3}}{2},\dfrac{-1}{2}\right)$ $\dfrac{7\pi}{6}$ 210° $\dfrac{5\pi}{4}$ $\dfrac{11\pi}{6}$ 330° $\dfrac{7\pi}{4}$ $\left(\dfrac{\sqrt{3}}{2},\dfrac{-1}{2}\right)-\dfrac{\sqrt{3}}{3}$

225°   315°

$1\left(\dfrac{-\sqrt{2}}{2},\dfrac{-\sqrt{2}}{2}\right)$ 240° $\dfrac{4\pi}{3}$ $\dfrac{3\pi}{2}$ $\dfrac{5\pi}{3}$ 300° $\left(\dfrac{\sqrt{2}}{2},\dfrac{-\sqrt{2}}{2}\right)-1$

270°

$\sqrt{3}\left(\dfrac{-1}{2},\dfrac{-\sqrt{3}}{2}\right)$ **(0, -1)** $\left(\dfrac{1}{2},\dfrac{-\sqrt{3}}{2}\right)-\sqrt{3}$

undefined

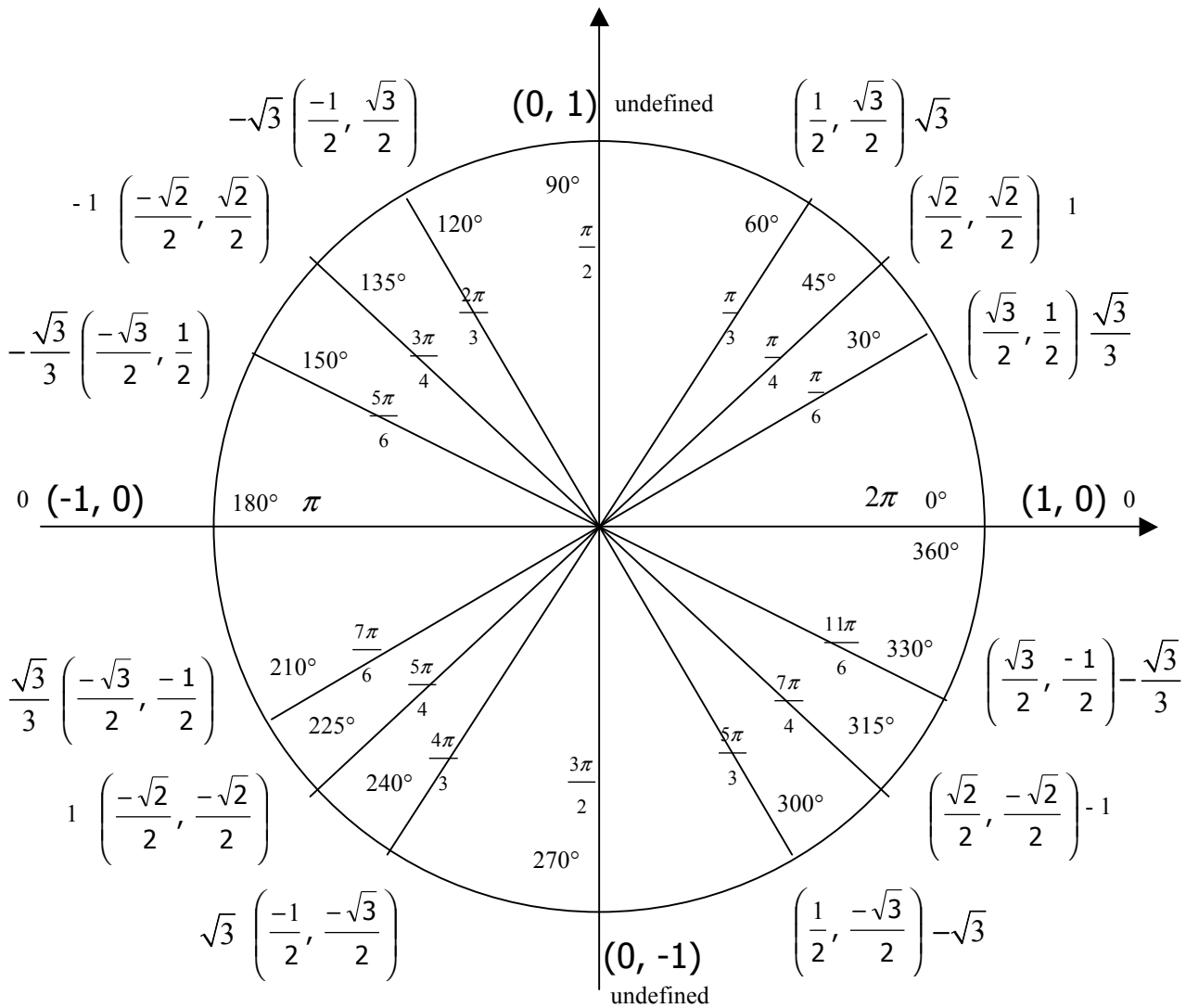**Law of Sines:**
$$\frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}$$

Law of Cosines:
$$c^2=a^2+b^2-2ab\cos C$$
$$a^2=b^2+c^2-2bc\cos A$$
$$b^2=a^2+c^2-2ac\cos B$$

Reciprocals:

$1\leftrightarrow 1$ $und\leftrightarrow 0$

$2\leftrightarrow\dfrac{1}{2}$ $\dfrac{\sqrt{3}}{2}\leftrightarrow\dfrac{2\sqrt{3}}{3}$

$\dfrac{\sqrt{2}}{2}\leftrightarrow\sqrt{2}$ $\dfrac{\sqrt{3}}{3}\leftrightarrow\sqrt{3}$

Trig Functions:

$\sin\theta=\dfrac{y}{r}$ $\csc\theta=\dfrac{r}{y}$

$\cos\theta=\dfrac{x}{r}$ $\sec\theta=\dfrac{r}{x}$

$\tan\theta=\dfrac{y}{x}$ $\cot\theta=\dfrac{x}{y}$

TRIGONOMETRIC IDENTITIES

Pythagorean Relationships

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

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

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

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

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

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

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

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

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

Sum/Difference

$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

$$\tan(\alpha-\beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

Reciprocal/Quotient Relationships

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

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

$$\cot\theta = \frac{1}{\tan\theta} \qquad \tan\theta = \frac{1}{\cot\theta}$$

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

Power-Reducing Identities

$$\sin^2 x = \frac{1 - \cos 2x}{2}$$

$$\cos^2 x = \frac{1 + \cos 2x}{2}$$

$$\tan^2 x = \frac{1 - \cos 2x}{1 + \cos 2x}$$

Double Angle Identities

$$\sin 2\theta = 2\sin\theta \cdot \cos\theta \qquad \tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$$

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

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

$$\cos 2\theta = 2\cos^2\theta - 1$$

Odd/Even

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

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

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

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

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

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