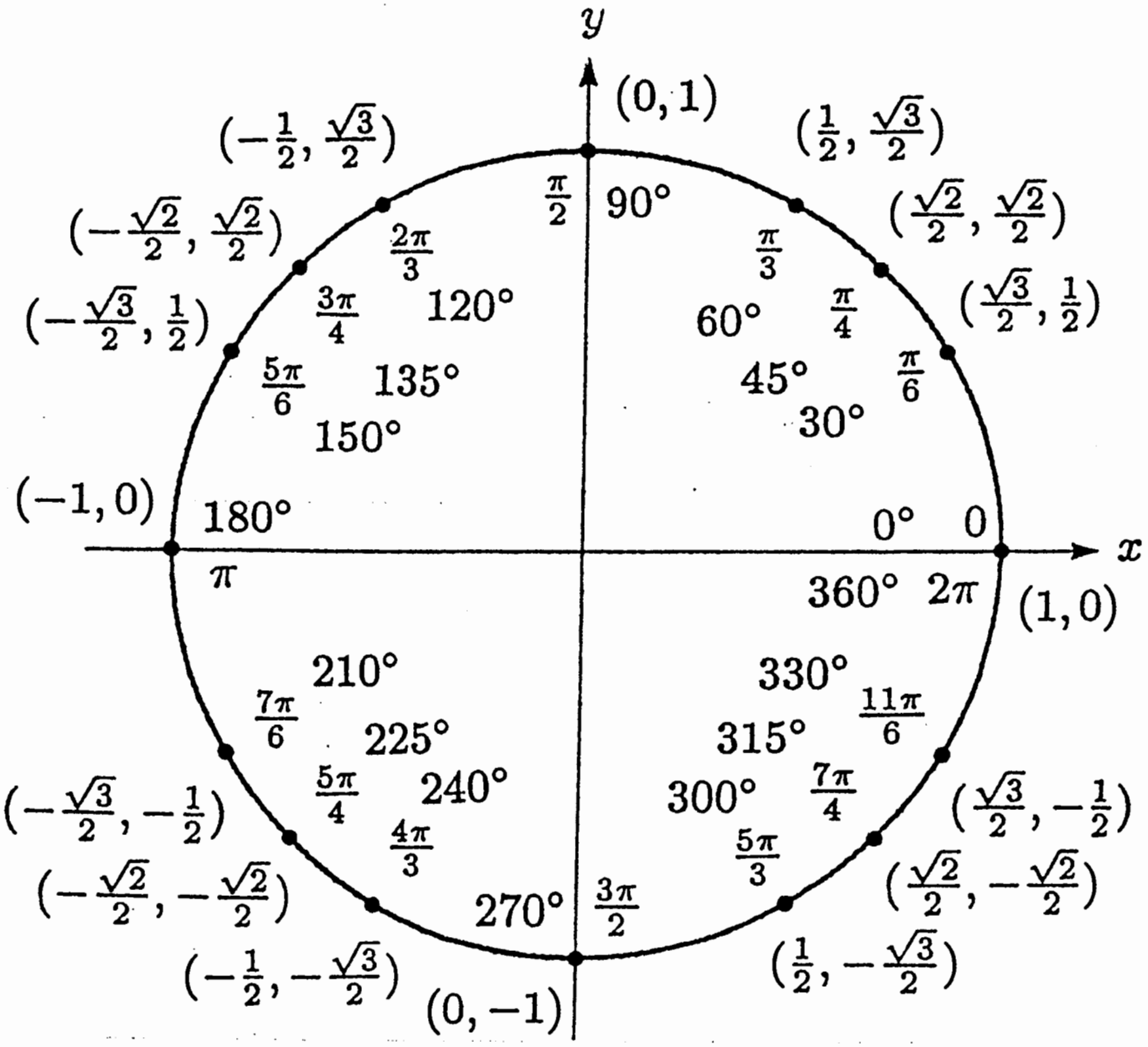

y
x
(0, 1)
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
(1, 0)
$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$
$(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$
(0, −1)
$(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$
$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$
(−1, 0)
$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$
$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$
$\frac{\pi}{2}$
90°
$\frac{\pi}{3}$
60°
$\frac{\pi}{4}$
45°
$\frac{\pi}{6}$
30°
0°
0
360°
2π
$\frac{11\pi}{6}$
330°
$\frac{7\pi}{4}$
315°
$\frac{5\pi}{3}$
300°
$\frac{3\pi}{2}$
270°
$\frac{4\pi}{3}$
240°
$\frac{5\pi}{4}$
225°
$\frac{7\pi}{6}$
210°
π
180°
$\frac{5\pi}{6}$
150°
$\frac{3\pi}{4}$
135°
$\frac{2\pi}{3}$
120°

$\theta(degree)$	$\theta(radian)$	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\sec\theta$	$\csc\theta$	$\cot\theta$
0	0	0	1	0	1	U	U
30	$\pi/6$	$1/2$	$\sqrt{3}/2$	$1/\sqrt{3}$	$2/\sqrt{3}$	2	$\sqrt{3}$
45	$\pi/4$	$\sqrt{2}/2$	$\sqrt{2}/2$	1	$\sqrt{2}$	$\sqrt{2}$	1
60	$\pi/3$	$\sqrt{3}/2$	$1/2$	$\sqrt{3}$	2	$2/\sqrt{3}$	$1/\sqrt{3}$
90	$\pi/2$	1	0	U	U	1	0
120	$2\pi/3$	$\sqrt{3}/2$	$-1/2$	$-\sqrt{3}$	-2	$2/\sqrt{3}$	$-1/\sqrt{3}$
135	$3\pi/4$	$\sqrt{2}/2$	$-\sqrt{2}/2$	-1	$-\sqrt{2}$	$\sqrt{2}$	-1
150	$5\pi/6$	$1/2$	$-\sqrt{3}/2$	$-1/\sqrt{3}$	$-2/\sqrt{3}$	2	$-\sqrt{3}$
180	π	0	-1	0	-1	U	U
210	$7\pi/6$	$-1/2$	$-\sqrt{3}/2$	$1/\sqrt{3}$	$-2/\sqrt{3}$	-2	$\sqrt{3}$
225	$5\pi/4$	$-\sqrt{2}/2$	$-\sqrt{2}/2$	1	$-\sqrt{2}$	$-\sqrt{2}$	1
240	$4\pi/3$	$-\sqrt{3}/2$	$-1/2$	$\sqrt{3}$	-2	$-2/\sqrt{3}$	$1/\sqrt{3}$
270	$3\pi/2$	-1	0	U	U	-1	0
300	$5\pi/3$	$-\sqrt{3}/2$	$1/2$	$-\sqrt{3}$	2	$-2/\sqrt{3}$	$-1/\sqrt{3}$
315	$7\pi/4$	$-\sqrt{2}/2$	$\sqrt{2}/2$	-1	$\sqrt{2}$	$-\sqrt{2}$	-1
330	$11\pi/6$	$-1/2$	$\sqrt{3}/2$	$-1/\sqrt{3}$	$2/\sqrt{3}$	-2	$-\sqrt{3}$

Precalculus Mathematics: Trig. Identities to Know

Sum/Difference of Angles

1. $\cos(\alpha \mp \beta) = \cos(\alpha)\cos(\beta) \pm \sin(\alpha)\sin(\beta)$
2. $\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$
3. $\tan(\alpha \pm \beta) = \dfrac{\tan(\alpha) \pm \tan(\beta)}{1 \mp \tan(\alpha)\tan(\beta)}$

Double Angles

1. $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$
2. $\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta) = 1 - 2\sin^2(\theta) = 2\cos^2(\theta) - 1$
3. $\tan(2\theta) = \dfrac{2\tan(\theta)}{1 - \tan^2(\theta)}$

Half Angles

1. $\sin\left(\dfrac{\theta}{2}\right) = \pm\sqrt{\dfrac{(1 - cos(\theta)}{2}}$
2. $\cos\left(\dfrac{\theta}{2}\right) = \pm\sqrt{\dfrac{(1 + cos(\theta)}{2}}$
3. $\tan\left(\dfrac{\theta}{2}\right) = \dfrac{\sin(\theta)}{1 + \cos(\theta)}$

Sinusoidal

$A\sin(bx + \phi) = a\sin(bx + h) + d\cos(bx + k)$, where $A = \sqrt{a^2 + d^2}$ and $\tan(\phi) = \dfrac{a\sin(h) + d\cos(k)}{a\cos(h) - d\sin(k)}$

Product Identities

1. $\cos(\alpha)\cos(\beta) = \dfrac{1}{2}(\cos(\alpha - \beta) + \cos(\alpha + \beta))$
2. $\sin(\alpha)\sin(\beta) = \dfrac{1}{2}(\cos(\alpha - \beta) - \cos(\alpha + \beta))$
3. $\sin(\alpha)\cos(\beta) = \dfrac{1}{2}(\sin(\alpha - \beta) + \sin(\alpha + \beta))$

Law of Sines

$$\frac{\sin(\alpha)}{a} = \frac{\sin(\beta)}{b} = \frac{\sin(\gamma)}{c}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc\cos(\alpha)$$

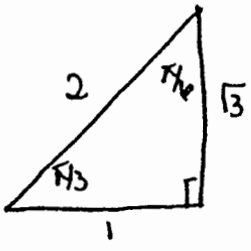
Pythagorean Identities

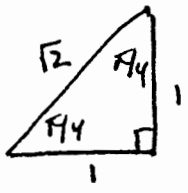
1. $\sin^2(\theta) + \cos^2(\theta) = 1$
2. $1 + \tan^2(\theta) = \sec^2(\theta)$
3. $1 + \cot^2(\theta) = \csc^2(\theta)$

Reciprocal Identities

1. $\sec(\theta) = \dfrac{1}{\cos(\theta)}$
2. $\csc(\theta) = \dfrac{1}{\sin(\theta)}$
3. $\tan(\theta) = \dfrac{1}{\cot(\theta)} = \dfrac{\sin(\theta)}{\cos(\theta)}$

Special Angles





TRIGONOMETRIC IDENTITIES

MEMORIZE

PYTHAGOREAN IDENTITIES

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

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

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

ODD-EVEN IDENTITIES

$\sin(-u) = -\sin u$ $\qquad$ $\csc(-u) = -\csc u$

$\cos(-u) = \cos u$ $\qquad$ $\sec(-u) = \sec u$

$\tan(-u) = -\tan u$ $\qquad$ $\cot(-u) = -\cot u$

DOUBLE-ANGLE IDENTITIES

$\sin 2u = 2\sin u \cos u$

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

$= 2\cos^2 u - 1$

$= 1 - 2\sin^2 u$

$$\tan 2u = \frac{2 \tan u}{1 - \tan^2 u}$$

HALF-ANGLE IDENTITIES

$$\sin\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1 - \cos u}{2}}$$

$$\cos\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1 + \cos u}{2}}$$

$$\tan\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1 - \cos u}{1 + \cos u}} = \frac{1 - \cos u}{\sin u} = \frac{\sin u}{1 + \cos u}$$

POWER-REDUCING IDENTITIES

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

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

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