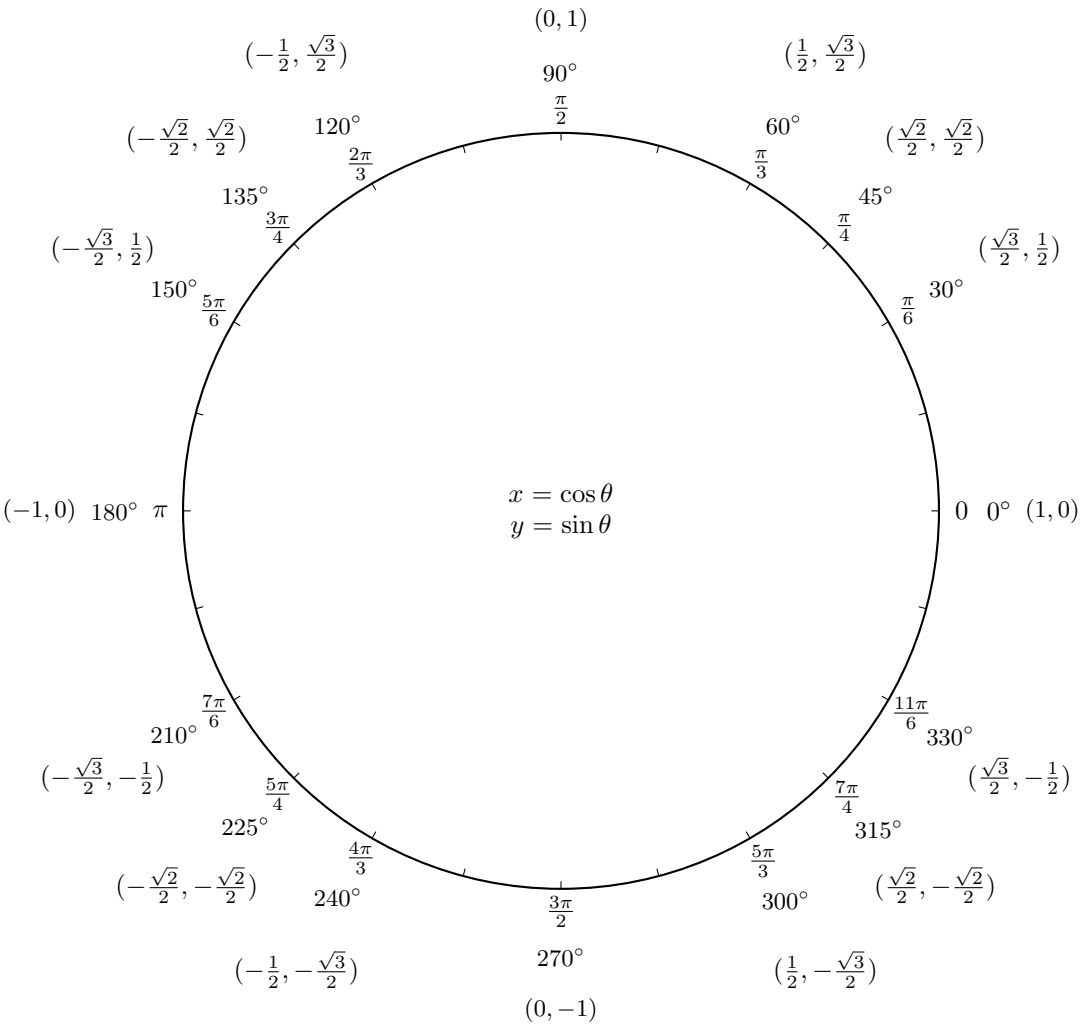
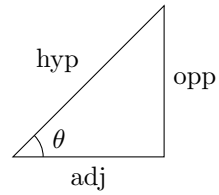
Trigonometry Reference Guide



Trig & Right Triangles



$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \csc\theta = \frac{\text{hyp}}{\text{opp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \sec\theta = \frac{\text{hyp}}{\text{adj}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \qquad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

Relations Between the Trig Functions

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

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

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

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

Pythagorean Identities

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

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

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

Angle Sum Formulas

$$\cos(u \pm v) = \cos(u)\cos(v) \mp \sin(u)\sin(v)$$

$$\sin(u \pm v) = \sin(u)\cos(v) \pm \cos(u)\sin(v)$$

$$\tan(u \pm v) = \frac{\tan(u) \pm \tan(v)}{1 \mp \tan(u)\tan(v)}$$

Double Angle Formulas

$$\sin(2\theta) = 2\sin(\theta)\cos(\theta)$$

$$\begin{aligned}\cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\ &= 1 - 2\sin^2(\theta)\\ &= 2\cos^2(\theta) - 1\end{aligned}$$

$$\tan(2\theta) = \frac{2\tan(\theta)}{1 - \tan^2(\theta)}$$

Power Reducing Formulas

$$\sin^2\theta = \tfrac{1}{2}\big[1 - \cos(2\theta)\big]$$

$$\cos^2\theta = \tfrac{1}{2}\big[1 + \cos(2\theta)\big]$$

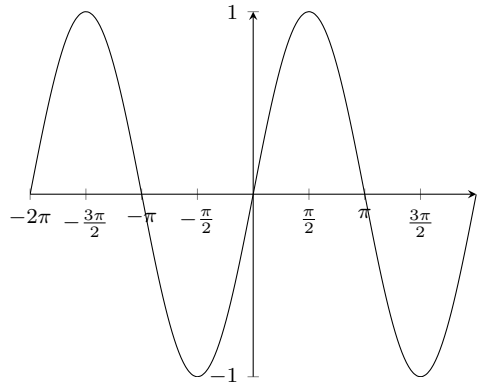
Product-to-Sum Formulas

$$\sin(u)\sin(v) = \tfrac{1}{2}\big[\cos(u-v) - \cos(u+v)\big]$$

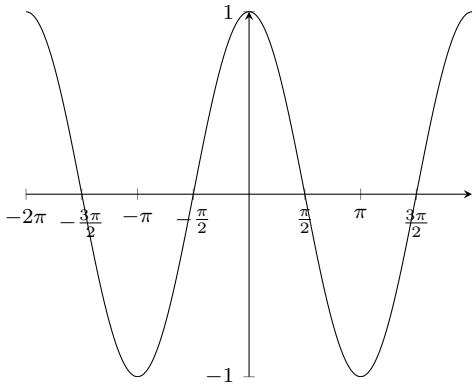
$$\cos(u)\cos(v) = \tfrac{1}{2}\big[\cos(u-v) + \cos(u+v)\big]$$

$$\sin(u)\cos(v) = \tfrac{1}{2}\big[\sin(u-v) + \sin(u+v)\big]$$

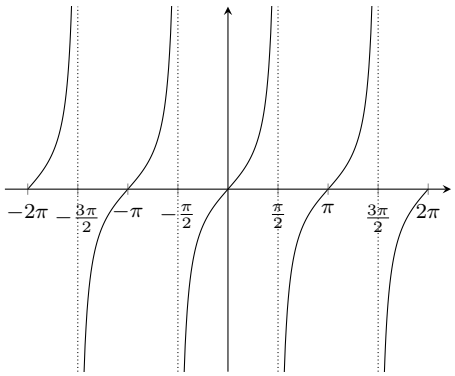
$y = \sin x$



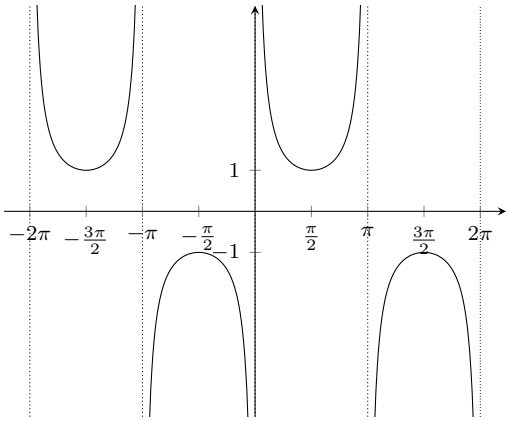
$y = \cos x$



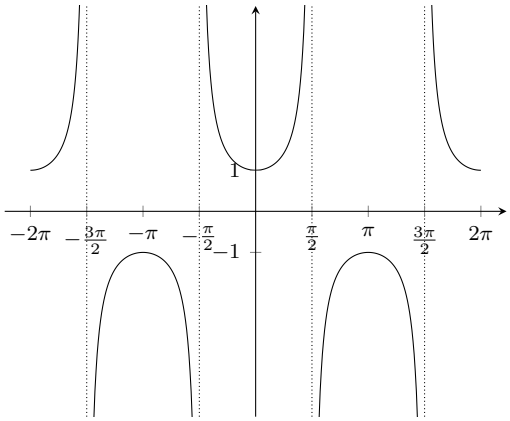
$y = \tan x$



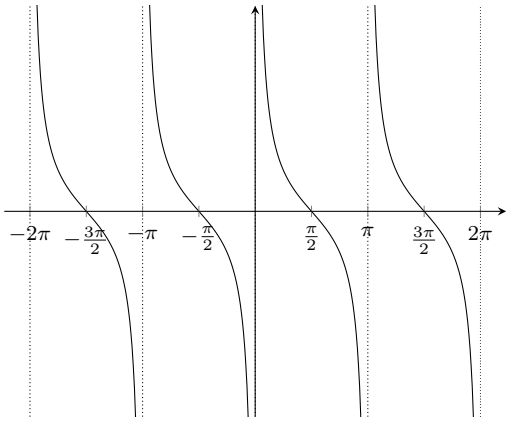
$y = \csc x$



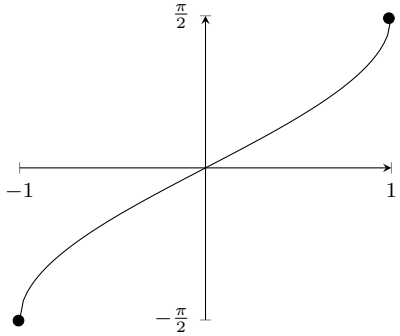
$y = \sec x$



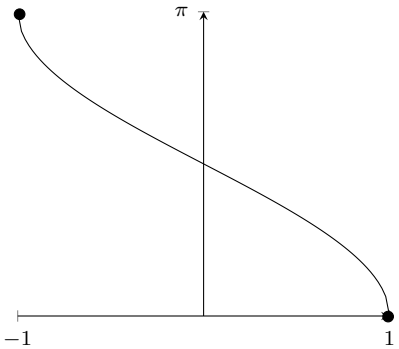
$y = \cot x$



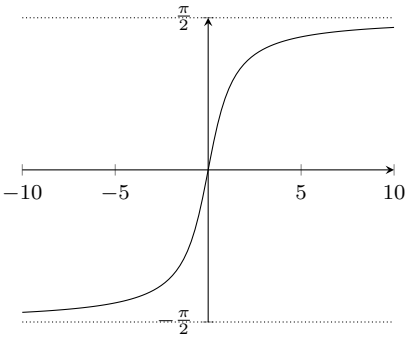
$y = \arcsin x$



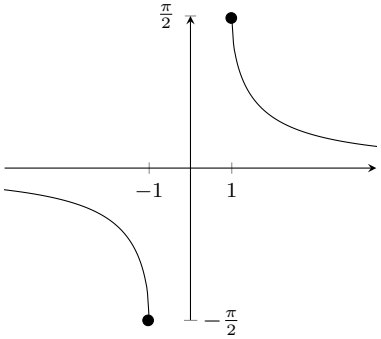
$y = \arccos x$



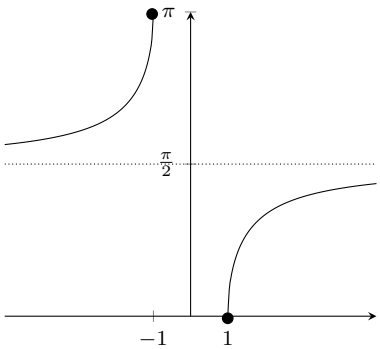
$y = \arctan x$



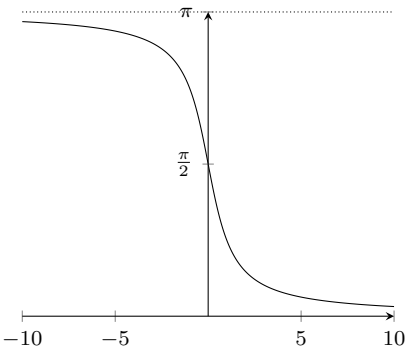
$y = \operatorname{arccsc} x$



$y = \operatorname{arcsec} x$



$y = \operatorname{arccot} x$



Source: Sullivan (2016). *Trigonometry, 10e.* Pearson.