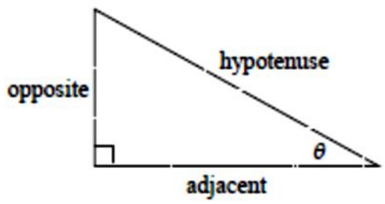
Trig Cheat Sheet

Definition of the Trig Functions

Right triangle definition
For this definition we assume that
$0 < \theta < \frac{\pi}{2}$ or $0° < \theta < 90°$.

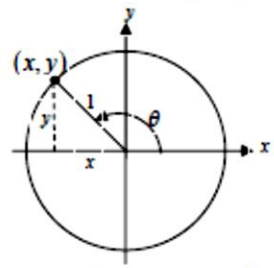


$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\csc\theta = \frac{\text{hypotenuse}}{\text{opposite}}$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\sec\theta = \frac{\text{hypotenuse}}{\text{adjacent}}$

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$ $\cot\theta = \frac{\text{adjacent}}{\text{opposite}}$

Unit circle definition
For this definition θ is any angle.



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

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

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

Tangent and Cotangent Identities

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

Reciprocal Identities

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

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

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

Pythagorean Identities

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

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

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

Formula Sheet for

Distance Between Two Points Formula	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Midpoint Formula	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
Standard Equation of a Circle	$(x-h)^2 + (y-k)^2 = r^2$
Slope Formula	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Point-Slope Equation of a Line	$y - y_1 = m(x - x_1)$
Slope-Intercept Equation of a Line	$y = mx + b$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Vertex Formula	$\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

Trig Functions

$\frac{d}{dx}(\sin x) = \cos x$ $\frac{d}{dx}(\cos x) = -\sin x$ $\frac{d}{dx}(\tan x) = \sec^2 x$

$\frac{d}{dx}(\sec x) = \sec x \tan x$ $\frac{d}{dx}(\csc x) = -\csc x \cot x$ $\frac{d}{dx}(\cot x) = -\csc^2 x$

Derivatives

Basic Properties/Formulas/Rules

$\frac{d}{dx}(cf(x)) = cf'(x)$, c is any constant. $(f(x) \pm g(x))' = f'(x) \pm g'(x)$

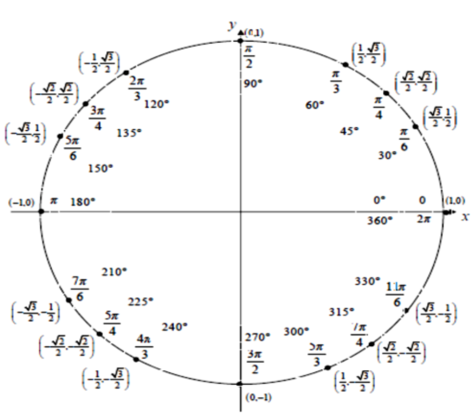
$\frac{d}{dx}(x^n) = nx^{n-1}$, n is any number. $\frac{d}{dx}(c) = 0$, c is any constant.

$(fg)' = f'g + fg'$ – **(Product Rule)** $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$ – **(Quotient Rule)**

$\frac{d}{dx}(f(g(x))) = f'(g(x))g'(x)$ **(Chain Rule)**

$\frac{d}{dx}\left(e^{g(x)}\right) = g'(x)e^{g(x)}$ $\frac{d}{dx}(\ln g(x)) = \frac{g'(x)}{g(x)}$

Unit Circle



For any ordered pair on the unit circle (x, y) : $\cos\theta = x$ and $\sin\theta = y$

Integrals

Basic Properties/Formulas/Rules

$\int cf(x)\,dx = c\int f(x)\,dx$, c is a constant. $\int f(x) \pm g(x)\,dx = \int f(x)\,dx \pm \int g(x)\,dx$

$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$ where $F(x) = \int f(x)\,dx$

$\int_a^b cf(x)\,dx = c\int_a^b f(x)\,dx$, c is a constant. $\int_a^b f(x) \pm g(x)\,dx = \int_a^b f(x)\,dx \pm \int_a^b g(x)\,dx$

$\int_a^a f(x)\,dx = 0$ $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

$\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$ $\int_a^b c\,dx = c(b-a)$

If $f(x) \ge 0$ on $a \le x \le b$ then $\int_a^b f(x)\,dx \ge 0$

If $f(x) \ge g(x)$ on $a \le x \le b$ then $\int_a^b f(x)\,dx \ge \int_a^b g(x)\,dx$