# Trigonometric Functions
# Identities, Limits and Derivatives

$csc\,\theta = \dfrac{1}{sin\,\theta}$ $\quad sec\,\theta = \dfrac{1}{cos\,\theta}$ $\quad tan\,\theta = \dfrac{sin\,\theta}{cos\,\theta}$

$cot\,\theta = \dfrac{cos\,\theta}{sin\,\theta}$ $\quad cot\,\theta = \dfrac{1}{tan\,\theta}$

$sin^2\theta + cos^2\theta = 1$ $\quad 1 + tan^2\theta = sec^2\theta$ $\quad 1 + cot^2\theta = csc^2\theta$

$sin(-\theta) = -sin\,\theta cos(-\theta) = cos\,\theta$ $\quad tan(-\theta) = -tan\theta$

$sin(\pi/2 - \theta) = cos\,\theta$ $\quad cos(\pi/2 - \theta) = sin\,\theta$ $\quad tan(\pi/2 - \theta) = cot\,\theta$

$\lim\limits_{\theta \to 0} \dfrac{sin\,\theta}{\theta} = 1$ $\qquad\qquad$ $\lim\limits_{\theta \to 0} \dfrac{cos\,\theta - 1}{\theta} = 0$

Let $f(x) = sin\,x$, then $f'(x) = cos\,x$

Let $f(x) = cos\,x$, then $f'(x) = -sin\,x$

Let $f(x) = tan\,x$, then $f'(x) = sec^2x$

Let $f(x) = csc\,x$, then $f'(x) = -csc\,x\,cot\,x$

Let $f(x) = sec\,x$, then $f'(x) = sec\,x\,tan\,x$

Let $f(x) = cot\,x$, then $f'(x) = -csc^2x$