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

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

$\cos^2 x = 1 - \sin^2 x$ $\quad$ $\tan^2 x = \sec^2 x - 1$ $\quad$ $\cot^2 x = \csc^2 x - 1$

x	$\sin x$	$\cos x$	$\tan x$
0	$\frac{\sqrt{0}}{2} = 0$	$\frac{\sqrt{4}}{2} = 1$	$0 \div 1 = 0$
$\frac{\pi}{6}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2} \div \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{3}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2} \div \frac{\sqrt{2}}{2} = 1$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{3}}{2} \div \frac{1}{2} = \sqrt{3}$
$\frac{\pi}{2}$	$\frac{\sqrt{4}}{2} = 1$	$\frac{\sqrt{0}}{2} = 0$	$1 \div 0 = \textit{undefined}$

$\sin 2x = 2 \sin x \cos x$

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

$$ax^2 + bx + c = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The discriminant is $b^2 - 4ac$ (the expression in the radical)

If the discriminant is negative,
- both roots are complex,
- the graph has no x-intercepts, and
- the polynomial cannot be factored using only real numbers

If the discriminant is zero,
- the single root is real,
- the graph has 1 x-intercept and is tangent to the x-axis, and
- the polynomial can be factored into the square of a linear polynomial

If the discriminant is positive,
- both roots are real,
- the graph has 2 x-intercepts, and
- the polynomial can be factored into 2 linear polynomials

In addition, if a, b and c are all rational,

If the discriminant is positive and a perfect square,
- the polynomial can be factored into 2 linear polynomials with rational coefficients

If the discriminant is positive but not a perfect square,
- the polynomial can be factored into 2 linear polynomials with irrational coefficients

$y = f(x)$ is even if $f(-x) = f(x)$ for all x in the domain

$y = f(x)$ is even if the graph is symmetric over the y-axis

$y = f(x)$ is odd if $-f(-x) = f(x)$ for all x in the domain

$y = f(x)$ is odd if the graph is symmetric through the origin

$y = f(x)$ is one-to-one if no horizontal line crosses the graph more than once

$y = f(x)$ is onto if every horizontal line (within the co-domain) crosses the graph at least once

The range of $y = x^2$ is $[0, \infty)$.

The domain of $y = \tan x$ is $\left\{ x \neq \frac{\pi}{2} + n\pi \right\}$.

The (horizontal) asymptotes of $y = \tan^{-1} x$ are $y = \pm\frac{\pi}{2}$.

f is continuous at c if

$f(c)$ exists,

$\lim_{x \to c} f(x)$ exists, and

$\lim_{x \to c} f(x) = f(c)$

The linear approximation of $f(x)$ near $x = c$ is $f(x) \approx f(c) + f'(c)(x - c)$.

L'Hopital's Rule applies to the indeterminate forms $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0 \cdot \infty$, 0^0, 1^∞, and ∞^0.

To find the *x*-intercepts of $y = f(x)$, solve the equation $f(x) = 0$. That is, set $y = 0$ and solve for x.
To find the *y*-intercepts of $y = f(x)$, set $x = 0$ and evaluate y.

The horizontal asymptotes of $y = f(x)$ are $y = \lim_{x \to \pm\infty} f(x)$ if the limits exist.

Leibniz notation for the *n*-th derivative of $y = f(x)$ is $\frac{d^n y}{dx^n}$ or $\frac{d^n f}{dx^n}$ (eg. $\frac{d^2 y}{dx^2}$, $\frac{d^3 f}{dx^3}$).