⊛ Slope-Intercept form of a line passing through pts (x_1, y_1) & (x_2, y_2)

$$y = \underset{\substack{\uparrow \\ \text{slope}}}{m}x + \underset{\substack{\uparrow \\ \text{y-intercept } (0, b)}}{b}$$

slope formula : $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Standard line equation : $ax + by = c$, a & $b \neq 0$

⊛ Polynomials:

Polynomial function : $f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$ for some $n \geqslant 0$. with $a_n \neq 0$

If $n = 2$ we say quadratic function
$n = 3$ we say cubic function

degree of polynomial = n

leading coefficient = a_n

Eg. $f(x) = x^2 + 6x + 9 \rightsquigarrow$ Quadratic , leading coeff = 1.

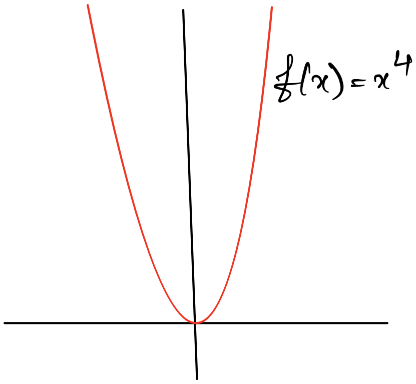
$f_1(x) = 100x^{47} + 8 \rightsquigarrow \deg(f_1) = 47$, leading coeff = 100

⊛ Roots of Quadratic $ax^2 + bx + c = 0$ given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

⊛ Power Functions: $f(x) = ax^b$.

Eg. $f(x) = x^4$



Behaviour at $\pm\infty$.

⊛ Algebraic Functions: rational form: $f(x) = \frac{p(x)}{q(x)}$, $q(x) \neq 0$

root form: $f(x) = \sqrt{p(x)}$, $p(x) \geqslant 0$

Eg ① $f(x) = \frac{3x-1}{5x+2}$. Domain, Range

$x \neq -\frac{2}{5}$ $y \neq -\frac{3}{5}$

② $f(x) = \sqrt{4-x^2}$. Domain, Range

$4-x^2 \geqslant 0$

$\Rightarrow x^2 \leq 4$

$\Rightarrow -2 \leq x \leq 2$

$[0,2]$

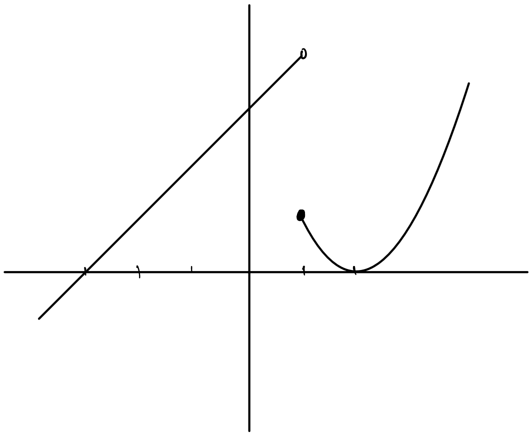
⊛ Transcendental Functions:

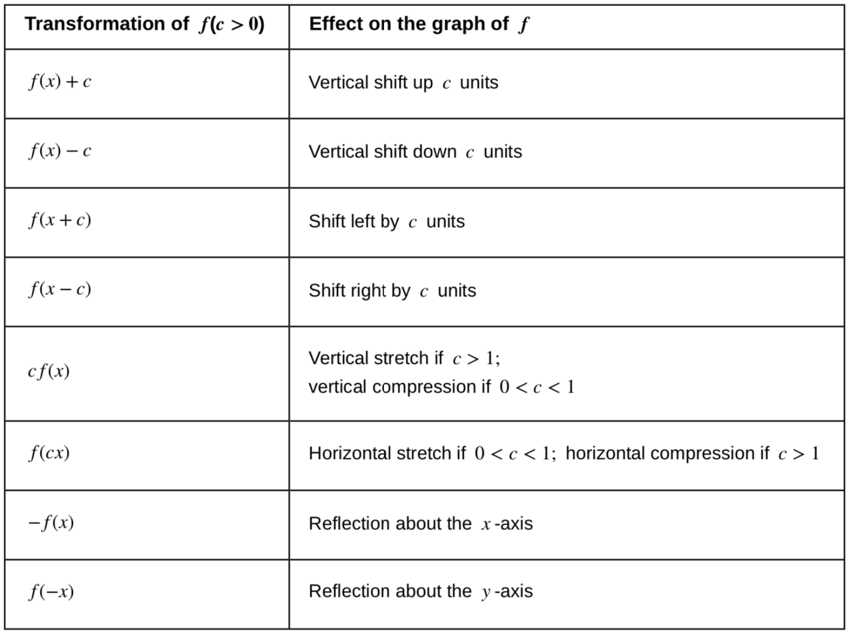
- trigonometric
- exponential
- logarithmic

} most common.

⊛ Piecewise defined functions:

$$f(x) = \begin{cases} x+3, & x<1 \\ (x-2)^2, & x\geq 1 \end{cases}$$





Transformation of $f (c>0)$	**Effect on the graph of f**
$f(x)+c$	Vertical shift up c units
$f(x)-c$	Vertical shift down c units
$f(x+c)$	Shift left by c units
$f(x-c)$	Shift right by c units
$cf(x)$	Vertical stretch if $c>1$; vertical compression if $0<c<1$
$f(cx)$	Horizontal stretch if $0<c<1$; horizontal compression if $c>1$
$-f(x)$	Reflection about the x-axis
$f(-x)$	Reflection about the y-axis