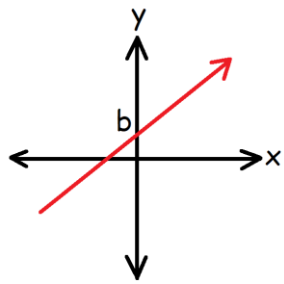
Domain and Range Formula Sheet:

Linear Functions:

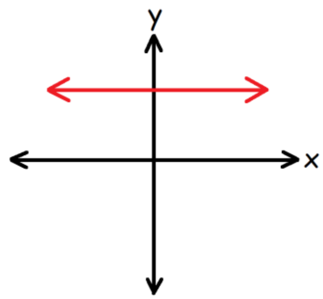
$$y = mx + b$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, \infty)$

Horizontal Line: (m = 0)

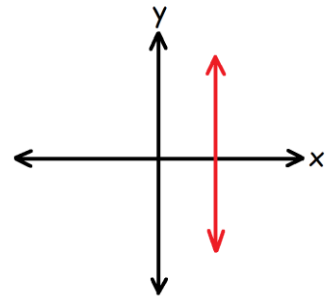
$$y = k$$



$Domain: (-\infty, \infty)$
$Range: \{k\}$

Vertical Line: (m = undefined)

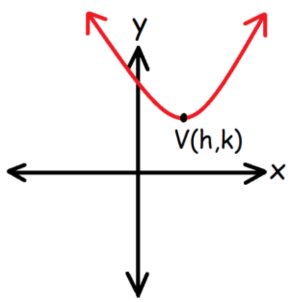
$$x = h$$



$Domain: \{h\}$
$Range: (-\infty, \infty)$

Quadratic Functions: (a = +)

$$y = ax^2 + bx + c$$

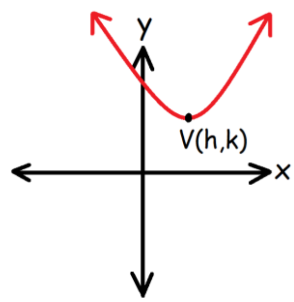


$Domain: (-\infty, \infty)$
$Range: [k, \infty)$

$h = -b/2a \quad k = f(-b/2a)$

Quadratic Functions: (a = +)

$$y = a(x-h)^2 + k$$

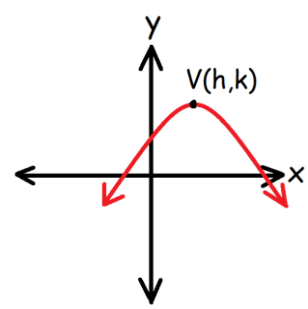


$Domain: (-\infty, \infty)$
$Range: [k, \infty)$

Vertex Form

Quadratic Functions: (a = -)

$$y = ax^2 + bx + c$$

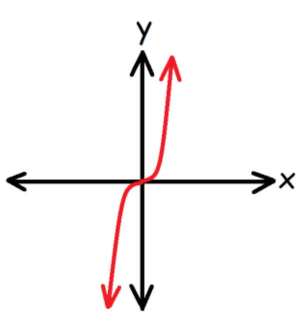


$Domain: (-\infty, \infty)$
$Range: (-\infty, k]$

Standard Form

Cubic Functions:

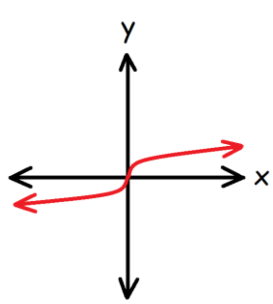
$$y = ax^3 + bx^2 + cx + d$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, \infty)$

Cube Root Function:

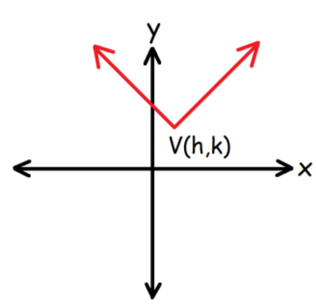
$$y = \sqrt[3]{x}$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, \infty)$

Absolute Value Functions: (a = +)

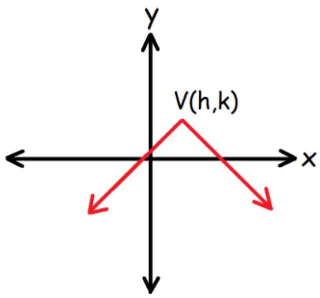
$$y = a|x-h| + k$$



$Domain: (-\infty, \infty)$
$Range: [k, \infty)$

Absolute Value Functions: (a = -)

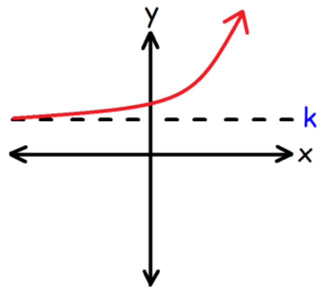
$$y = a|x - h| + k$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, k]$

Exponential Functions:

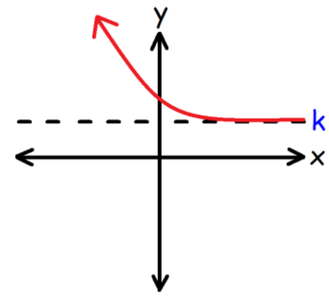
$$y = a^x + k$$



$Domain: (-\infty, \infty)$
$Range: (k, \infty)$

Exponential Functions:

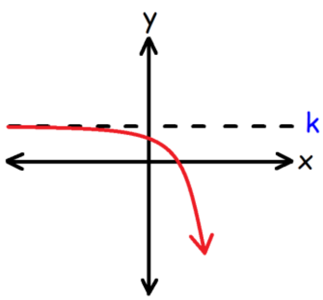
$$y = a^{-x} + k$$



$Domain: (-\infty, \infty)$
$Range: (k, \infty)$

Exponential Functions:

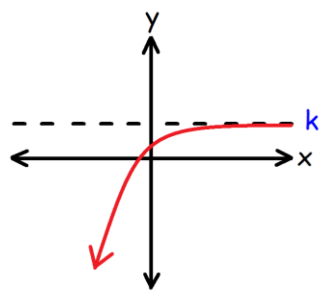
$$y = -a^x + k$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, k)$

Exponential Functions:

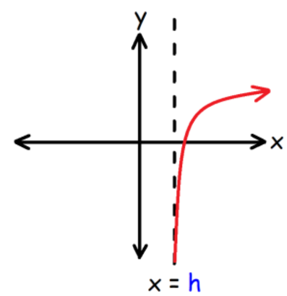
$$y = -a^{-x} + k$$



$Domain: (-\infty, \infty)$
$Range: (-\infty, k)$

Logarithmic Functions:

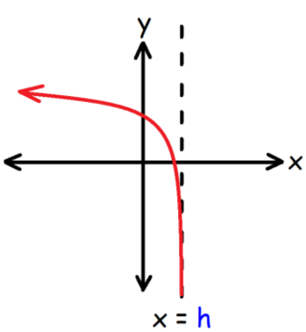
$$y = \log_a(x - h)$$



$Domain: (h, \infty)$
$Range: (-\infty, \infty)$

Logarithmic Functions:

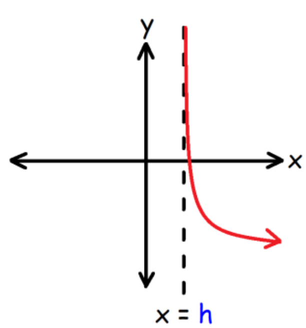
$$y = \log_a(h - x)$$



$Domain: (-\infty, h)$
$Range: (-\infty, \infty)$

Logarithmic Functions:

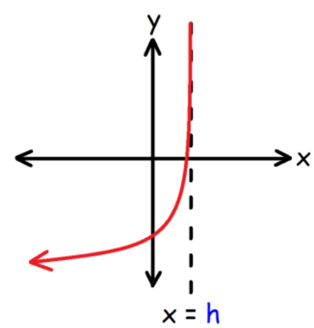
$$y = -\log_a(x - h)$$



$Domain: (h, \infty)$
$Range: (-\infty, \infty)$

Logarithmic Functions:

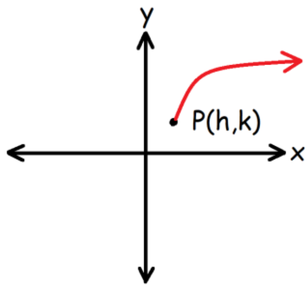
$$y = -\log_a(h - x)$$



$Domain: (-\infty, h)$
$Range: (-\infty, \infty)$

Radical Functions:

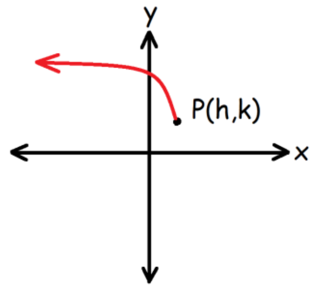
$$y = \sqrt{x - h} + k$$



$$Domain: \ [h, \infty)$$
$$Range: \ [k, \infty)$$

Radical Functions:

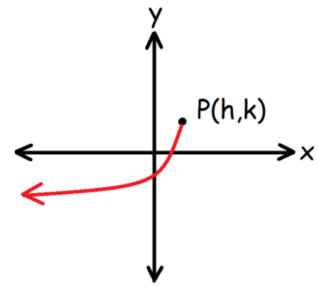
$$y = \sqrt{h - x} + k$$



$$Domain: \ (-\infty, h]$$
$$Range: \ [k, \infty)$$

Radical Functions:

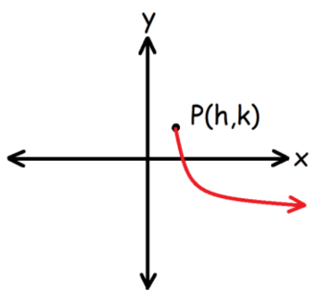
$$y = -\sqrt{h - x} + k$$



$$Domain: \ (-\infty, h]$$
$$Range: (-\infty, k]$$

Radical Functions:

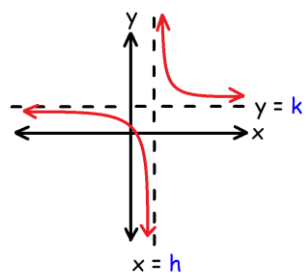
$$y = -\sqrt{x - h} + k$$



$$Domain: \ [h, \infty)$$
$$Range: \ (-\infty, k]$$

Rational Functions: (a > 0)

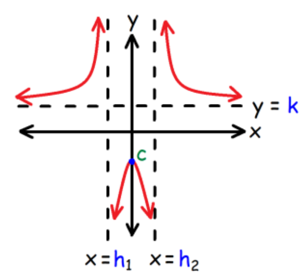
$$y = \frac{a}{x - h} + k$$



$$Domain: \ (-\infty, h) \ U \ (h, \infty)$$
$$Range: \ (-\infty, k) \ U \ (k, \infty)$$

Rational Functions: (a > 0, k > c)

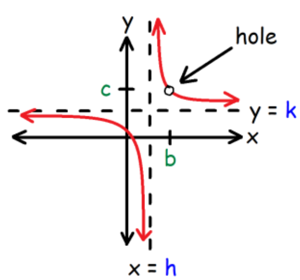
$$y = \frac{a}{(x - h_1)(x - h_2)} + k$$



$$D: (-\infty, h_1) \ U \ (h_1, h_2) \ U \ (h_2, \infty)$$
$$R: (-\infty, c) \ U \ (k, \infty)$$

Rational Functions:

$$y = \frac{a\cancel{(x - b)}}{(x - h)\cancel{(x - b)}} + k$$

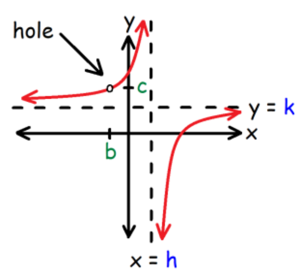


$$D: (-\infty, h) \ U \ (h, b) \ U \ (b, \infty)$$
$$R: (-\infty, k) \ U \ (k, c) \ U \ (c, \infty)$$

Note: b > h and c > k.

Rational Functions:

$$y = \frac{a\cancel{(x - b)}}{(x - h)\cancel{(x - b)}} + k$$

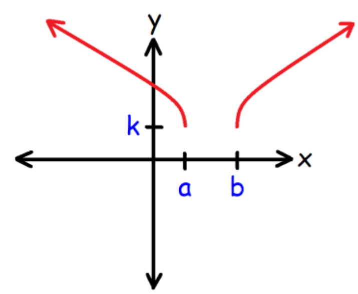


$$D: (-\infty, b) \ U \ (b, h) \ U \ (h, \infty)$$
$$R: (-\infty, k) \ U \ (k, c) \ U \ (c, \infty)$$

Note: h > b and c > k.

Complex Radical Functions:

$$y = \sqrt{(x - a)(x - b)} + k$$



$$Domain: \ (-\infty, a] \ U \ [b, \infty)$$
$$Range: \ [k, \infty)$$

Steps for Finding the Domain of Certain Functions:

1. $For\ y = \frac{1}{ax+b} \rightarrow\ \ Set\ ax + b \neq 0\ \ and\ solve\ for\ x.$

2. $For\ y = \sqrt{ax+b} \rightarrow\ \ Set\ ax + b \geq 0\ \ and\ solve\ for\ x.$

3. $For\ y = \sqrt{ax^2 + bx + c} \rightarrow\ \ Set\ ax^2 + bx + c \geq 0, factor\ and\ solve\ for\ x.$

4. $For\ y = \log_a(bx + c) \rightarrow\ \ Set\ bx + c > 0\ \ and\ solve\ for\ x.$

5. $For\ y = \frac{1}{\sqrt{ax+b}} \rightarrow\ \ Set\ ax + b\ > 0\ \ and\ solve\ for\ x.$

6. $For\ y = \frac{1}{\sqrt{ax^2+bx+c}} \rightarrow\ \ Set\ ax^2 + bx + c > 0, factor\ and\ solve\ for\ x.$

Note: A number line may be helpful for #3 and #6.