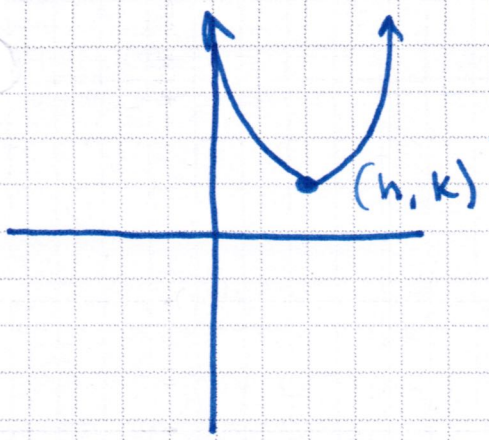
h = horz shift k = vertical shift

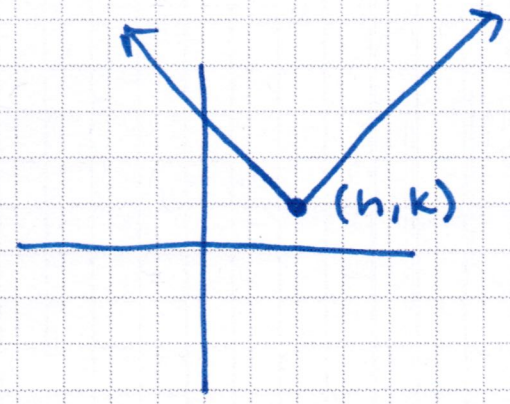
$(h,k) \rightarrow$ center ($a=1$ in all of our equations in Alg 1-2.)



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

D: $\mathbb{R}$

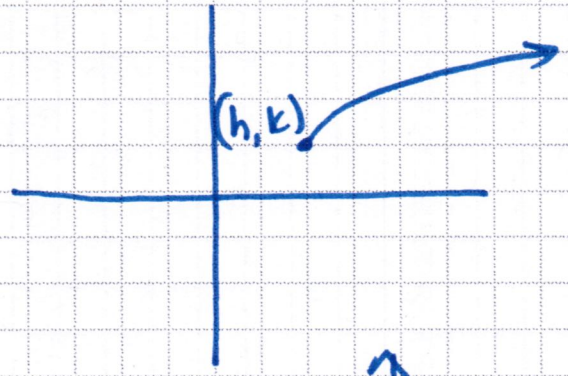
R: $\mathbb{R} \geq k$



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

D: $\mathbb{R}$

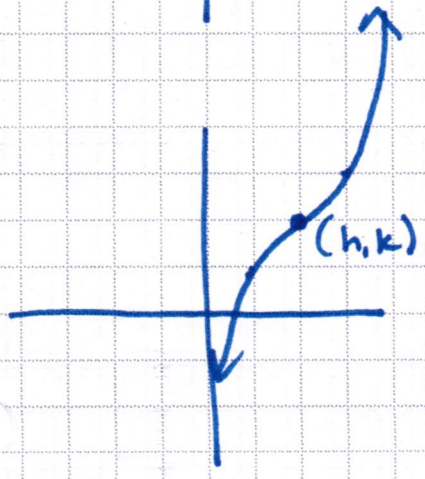
R: $\mathbb{R} \geq k$



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

D: $\mathbb{R} \geq h$

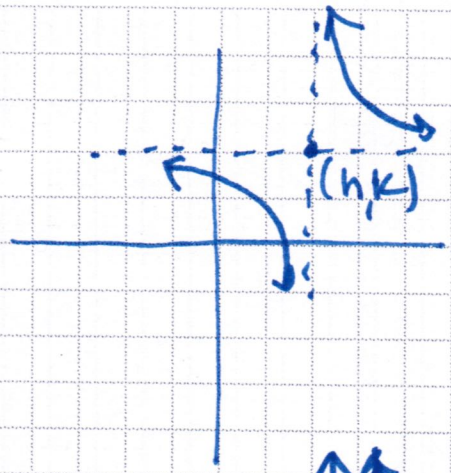
R: $\mathbb{R} \geq k$



$y = a(x-h)^3 + k$

D: $\mathbb{R}$

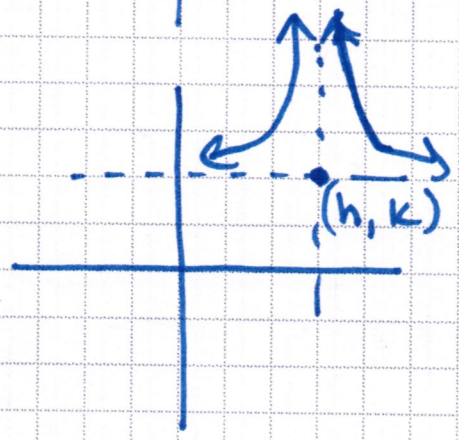
R: $\mathbb{R}$



$$y = \frac{a}{x-h} + k \qquad y = a\left(\frac{1}{x-h}\right) + k$$

D: $\mathbb{R} \neq h$

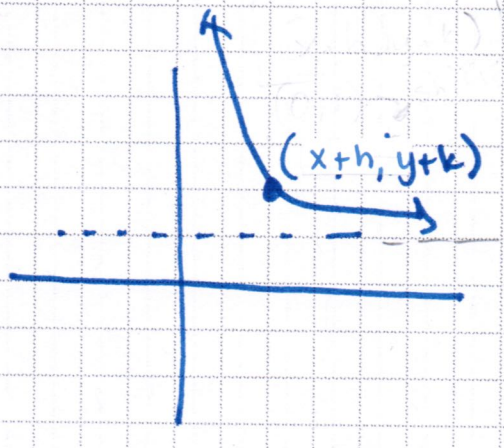
R: $\mathbb{R} \neq k$



$$y = \frac{a}{(x-h)^2} + k \qquad y = a\left(\frac{1}{(x-h)^2}\right) + k$$

D: $\mathbb{R} \neq h$

R: $\mathbb{R} > k$



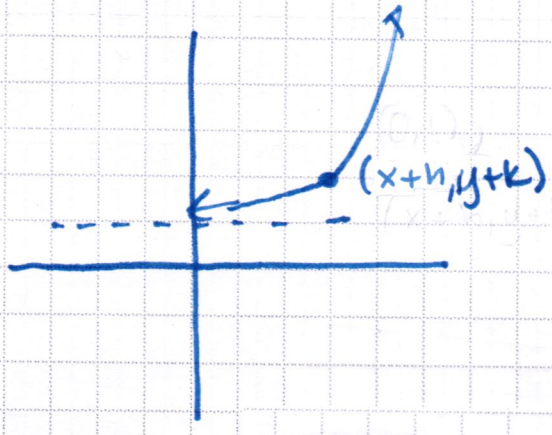
$$y = a(b)^{x-h} + k$$

$(0 < b < 1)$

$\Rightarrow$ alg 1-2 $b = \frac{1}{2}$

D: $\mathbb{R}$

R: $\mathbb{R} > k$



$$y = a(b)^{x-h} + k$$

$(b > 1)$

$\Rightarrow$ alg 1-2 $b = 2$

D: $\mathbb{R}$

R: $\mathbb{R} > k$

◎ I can write an equation from a graph.

Ex1]

parent $y = \sqrt{x}$

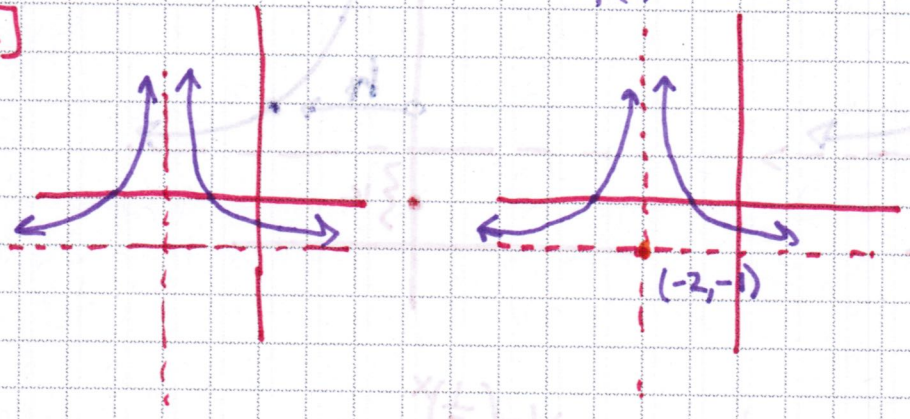
general (h,k) shift $y = \sqrt{x-h} + k$ $(h,k) = (3,1)$

$y = \sqrt{x-3} + 1$

$f(x) = \sqrt{x-3} + 1$ $\Rightarrow$ D: $\mathbb{R} \geq 3$

R: $\mathbb{R} \geq 1$

Ex 2]



parent $y = \frac{1}{x^2}$

general (h,k) shift $y = \frac{1}{(x-h)^2} + k$ $(h,k) = (-2,-1)$

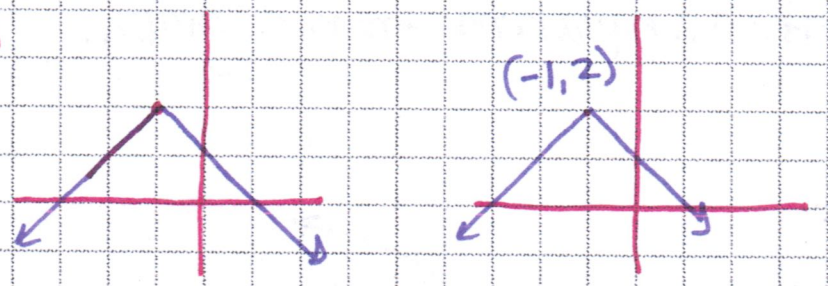
$y = \frac{1}{(x-2)^2} + -1$

$f(x) = \frac{1}{(x+2)^2} - 1$

D: $\mathbb{R} \neq -2$

R: $\mathbb{R} > -1$

EX3]



parent $y = |x|$

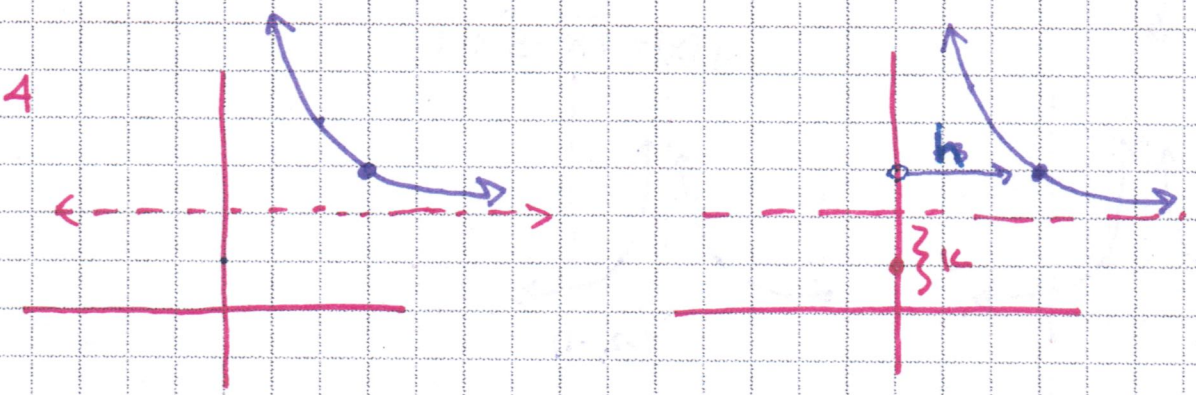
general (h,k) shift $y = -|x-h| + k$ $(h,k) = (-1,2)$

$y = -|x - {}^{-}1| + 2$

$f(x) = -|x+1| + 2 \Rightarrow$ D: $\mathbb{R}$

R: $\mathbb{R} \leq 2$

EX 4



parent $y = \left(\frac{1}{2}\right)^x$

general (h,k) shift $y = \left(\frac{1}{2}\right)^{x-h} + k$

$(h,k) = (3,2)$

$f(x) = \left(\frac{1}{2}\right)^{x-3} + 2 \rightarrow$ D: $\mathbb{R}$

R: $\mathbb{R} > 2$