

Review Transformation of Functions

1. Describe what each constant in $y = af(k(x-d))+c$ controls

a = Vertical stretch or compress
 $|a| > 1$ $|a| < 1$
 Reflection in x -axis, $a < 0$ (negative)

k = Horizontal stretch or compress
 $|k| < 1$ $|k| > 1$
 Reflection in y -axis, $k < 0$ (negative)

d = Horizontal shift left or right
 $d < 0$ $d > 0$
 $ex: f(x+3)$ $ex: f(x-3)$
 $d = -3$ $d = 3$

c = Vertical shift up or down
 $c > 0$ $c < 0$

3. Sketch each of the following

a. $h(x) = \frac{4}{6+0.5x} + 2$

$h(x) = \frac{4}{0.5(x+12)} + 2$

$a = 4$ $k = 0.5$ $c = 2$

$d = -12$ $y = \frac{1}{x}$

$Key: HA y=0$
 $V.A x=0$
 $(1,1)$
 $(-1,-1)$

2. Describe the most effective method of applying transformations.

① factor out "k" so we can see "d".
 $\hookrightarrow x$ has no number in front of it.

② use Mapping Rule to graph.

$$(x, y) \rightarrow \left(\frac{x}{k} + d, ay + c \right)$$

Key points:

x	y
1	2
$\frac{x}{k} + d$	$3y + 7$

$$\rightarrow \begin{array}{|c|c|} \hline \frac{x}{k} + d & 3y + 7 \\ \hline 4 & 13 \\ \hline \end{array}$$

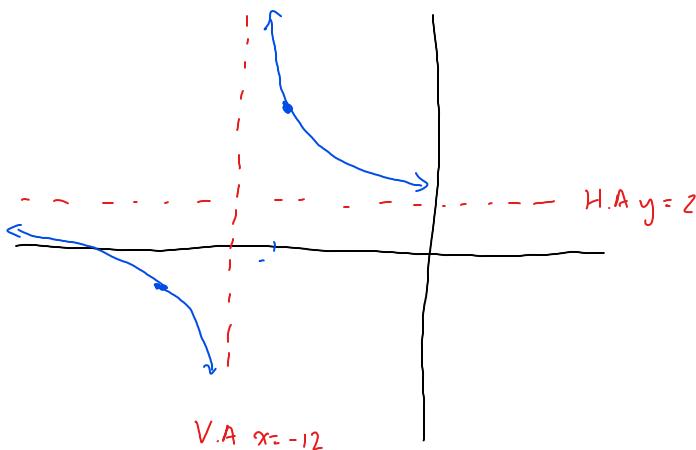
Parent: $y = \sqrt{x}$

b. $i(x) = 2\sqrt{4-x} - 1$

$i(x) = 2\sqrt{-1(x-4)} - 1$

$(0,0)$
 $(4,2)$
 $(9,3)$

vertical stretch by 2
 horizontal reflection over y -axis
 shift right 4 units
 shift down 1 unit



Review of Inverses of Functions $f^{-1}(x)$ or $g^{-1}(x)$

1. Clarify the meaning of the words opposite, reciprocal and inverse.

 <u>Opposite</u> \rightarrow switch sign	<u>Reciprocal</u> \rightarrow flip fraction ($\frac{a}{b}$)	<u>inputs \rightarrow outputs</u>
ex: $+ \rightarrow -$ $\times \rightarrow \div$ $x-4 \rightarrow -x+4$	ex: $\frac{a}{b} \rightarrow \frac{b}{a}$ $\frac{1}{2} \rightarrow \frac{2}{1}$ or 2 $\frac{2x}{1} \rightarrow \frac{1}{2x}$	Inverse \rightarrow <u>Undo</u> operations.
		ex: $+ \leftrightarrow -$ $\times \leftrightarrow \div$ $\sqrt{} \leftrightarrow$ squared $\sin(\cdot) \leftrightarrow \sin^{-1}(\cdot)$ "sine inverse"

2. Find the algebraic inverse for each of the following functions $f^{-1}(x) = ?$

a. $f(x) = 2x - 6$

$$\begin{aligned} \textcircled{1} \quad y &= 2x - 6 \\ \textcircled{2} \quad x &= 2y - 6 \\ \textcircled{3} \quad x+6 &= 2y \\ \frac{x+6}{2} &= y \\ \textcircled{4} \quad f^{-1}(x) &= \frac{x+6}{2} \end{aligned}$$

Steps:

- ① replace $f(x) = y$
- ② switch $x \leftrightarrow y$
- ③ Solve for y .
- ④ Replace y as $f^{-1}(x)$



$$f(x) = -x^2 + 2x - 9$$

$$f^{-1}(x) = \pm \sqrt{-(x+8)} + 1$$

b. $f(x) = \frac{x}{x-3}$

$$f^{-1}(x) = \frac{-3x}{1-x}$$

$$y = \frac{x}{x-3}$$

$$x = \frac{y}{y-3}$$

$$x(y-3) = y$$

$$\begin{aligned} xy - 3x &= y \\ -3x &= y - xy \\ -3x &= y(1-x) \\ \frac{-3x}{1-x} &= y \end{aligned}$$

c. $f(x) = -2(x+5)^2 + 8$

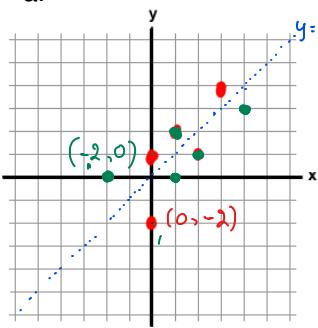
$$f^{-1}(x) = \pm \sqrt{\frac{x-8}{2}} - 5$$

→ Reflection over the line $y = x$

3. Find the graphical inverse of each of the following



a.

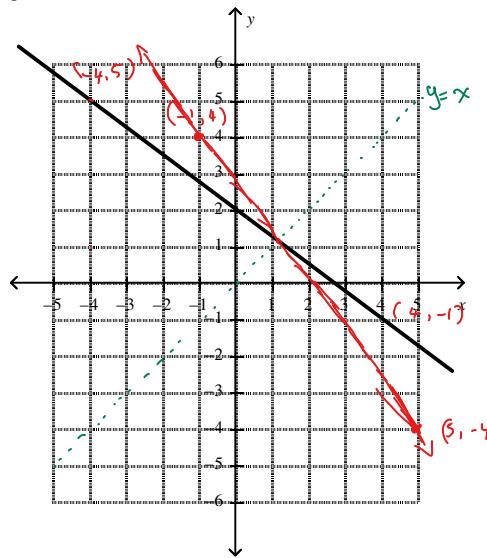


$$(x, y) \rightarrow (y, x)$$

$$(a, b) \rightarrow (b, a)$$

for point on the x & y
will switch for
inverse!

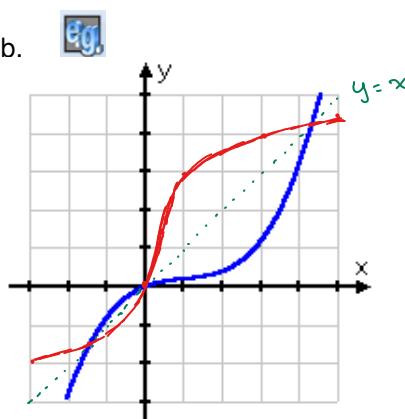
c.



e. Sketch $f(x) = -x^2 + 2x - 9$ (same question as 2d)

then sketch $f^{-1}(x)$ on the same grid

b.



How to Study:

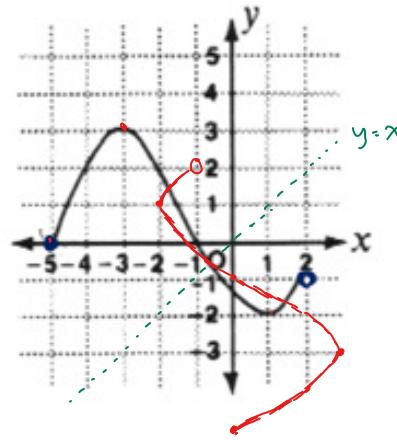
- ① Read over note
- ② Write journal
- ③ Practice.

Homework:

{ Pg. 35 # 1, 3, 5
} Pg. 43 # 3, 12

Journal Unit 1 # 2, 3

d.



4. Can you think of applications of inverse functions?