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CRMA 0372
College Readiness Algebra II
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Composition of functions :

$u(x) = x^2 + 5 \qquad u(1) = (1)^2 + 5 = 6$

$w(x) = \sqrt{x+3}$

$(w \circ u)(1) = w(u(1)) = w(6) = \sqrt{6+3} = \sqrt{9} = 3$

$(w \circ u)(x) = w(u(x)) = \sqrt{(x^2+5)+3} = \sqrt{x^2+8}$

Second function into first

$w(u(1)) = \sqrt{1^2+8} = \sqrt{9} = 3$

$(u \circ w)(x) = u(w(x)) = \left(\sqrt{x+3}\right)^2 + 5 = x+3+5 = x+8$

$(u \circ w)(1) = 1+8 = 9$

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$g(x) = \dfrac{-x+10}{11}$

$h = \{(-6,3), (-3,4), (3,-4), (5,6)\}$

x	y
$-6 \to$	3
$-3 \to$	4
$3 \to$	-4
$5 \to$	6

Find $g^{-1}(x)$

$y = \dfrac{-x+10}{11}$

$11(x) = \left(\dfrac{-y+10}{\cancel{11}}\right)\cancel{11}$

$11x = -y + \cancel{10}$
$-10 \qquad\quad -\cancel{10}$

$11x - 10 = -y$

$y = 10 - 11x$

$g^{-1}(x) = 10 - 11x$

$$(g \circ g^{-1})(x) = \frac{-(10-11x)+10}{11}$$

$$= \frac{11x - \cancel{10} + \cancel{10}}{11}$$

$$= \frac{\cancel{11}x}{\cancel{11}}$$

$$= x$$

Find $(g \circ g^{-1})(1) = 1$

Find $h^{-1}(3)$

$h = \{(-6,3), (-3,4), (3,-4), (5,6)\}$

$h^{-1} = \{(3,-6), (4,-3), (-4,3), (6,5)\}$

$h^{-1}(3) = -6$

$f(x) = \dfrac{x}{7x-9}$

Domain: $7x - 9 \neq 0$

$7x \neq 9$

$x \neq 9/7$

$(-\infty, 9/7) \cup (9/7, \infty)$

Find $f^{-1}(x)$

$$y = \frac{x}{7x-9}$$

$$(7y-9)\,x = \frac{y}{\cancel{(7y-9)}}\,\cancel{(7y-9)}$$

$$y = x(7y-9)$$

$y = 7xy - 9x$

$y - 7xy = -9x$

$\frac{y\cancel{(1-7x)}}{\cancel{(1-7x)}} = \frac{-9x}{(1-7x)}$

$y = \frac{-9x}{1-7x}$

$f^{-1}(x) = \frac{-9x}{1-7x}$

Domain of $f^{-1}(x)$

$1-7x \neq 0$

$\frac{1}{7} \neq \frac{\cancel{7}x}{\cancel{7}}$

$x \neq \frac{1}{7}$

$(-\infty, \frac{1}{7}) \cup (\frac{1}{7}, \infty)$

Range of $f^{-1}(x) = (-\infty, \frac{9}{7}) \cup (\frac{9}{7}, \infty)$

\# $f(x) = \sqrt{2x+6}$

Find $f^{-1}(x)$

$y = \sqrt{2x+6}$

$(x)^2 = (\sqrt{2y+6})^2$

$x^2 = 2y + \cancel{6}$
$-6 \quad\quad -\cancel{6}$

$\frac{\cancel{2}y}{\cancel{2}} = \frac{x^2-6}{2}$

$y = \frac{x^2-6}{2}$ $\quad\quad f^{-1}(x) = \frac{x^2-6}{2}$

Domain of $f(x)$: $2x+6 \geq 0$

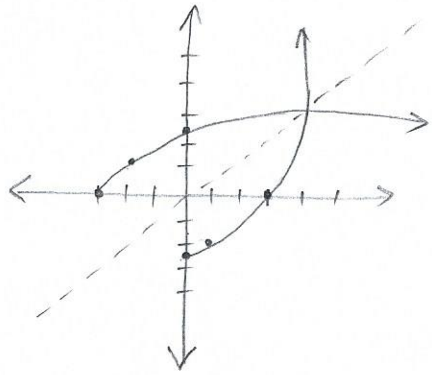
$\frac{2x}{\cancel{2}} \geq \frac{-6}{2}$ $\quad [-3, \infty)$

$x \geq -3$

Range of $f(x)$:

x	y
-3	0 ←
0	$\sqrt{6}$
1	$\sqrt{8}$
10	$\sqrt{26}$

$[0, \infty)$



Restricted Domain of $f^{-1}(x) = [0, \infty)$

$$a^{m/n} = \sqrt[n]{a^m}$$

$$8^{2/3} = (\sqrt[3]{8})^2 = 2^2 = 4$$

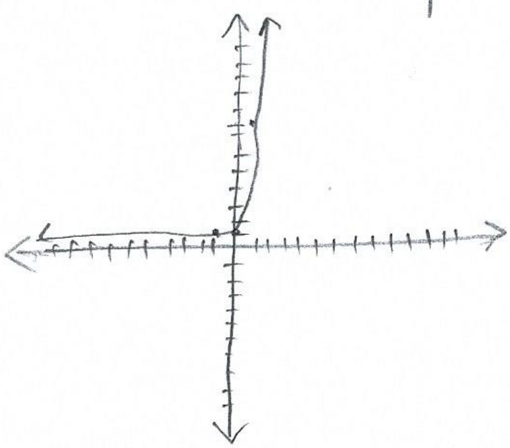
or, $\sqrt[3]{8^2} = \sqrt[3]{64} = 4$

$$25^{3/2} = (\sqrt{25})^3 = 5^3 = 125$$

Graph:

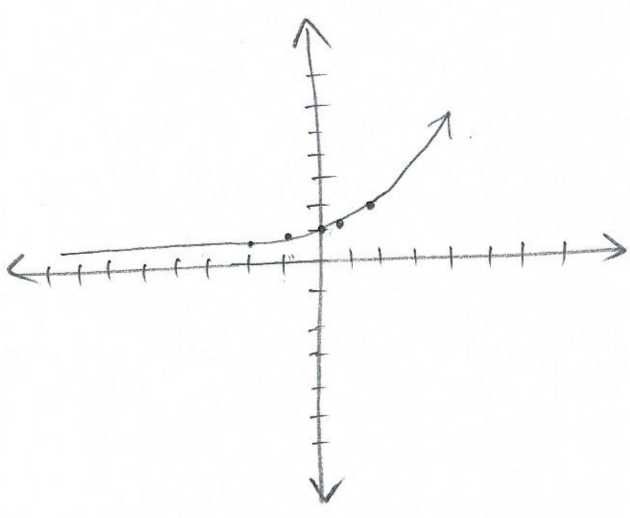
$g(x) = 8^x$

x	y
-1	1/8
0	1
1	8



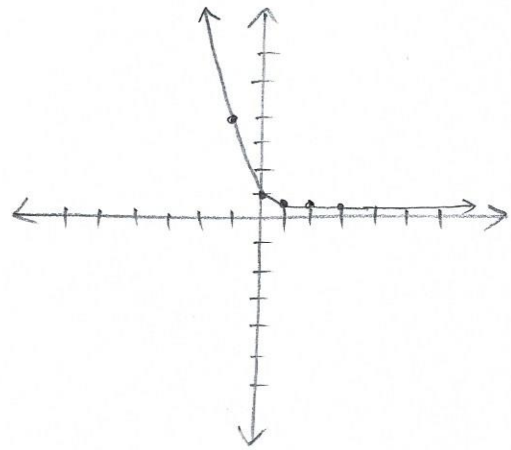
$h(x) = \left(\frac{4}{3}\right)^x$

x	y
-2	9/16
-1	3/4
0	1
1	4/3
2	16/9



$f(x) = \left(\frac{1}{4}\right)^x$

x	y
-2	16
-1	4
0	1
1	1/4
2	1/16



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$\log_b x = y$ means $b^y = x$

$\hookrightarrow$ if base is not written it is 10

$e^1 \approx 2.718\ldots\ldots$

$\ln x = y$ means $e^y = x$

is base e

$\log_3 \frac{1}{9} = ? = x$

$3^x = \frac{1}{9}$

$3^x = \frac{1}{3^2}$

$3^x = 3^{-2}$

$x = -2$