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College Algebra Extra Credit Mar 19

§6.2

#29

The domain of a one-to-one function g is $(-\infty, 0]$ and its range is $[4, \infty)$.

what is the domain and range of g^{-1}?

	g	g^{-1}
Domain	$(-\infty, 0]$	$[4, \infty)$
Range	$[4, \infty)$	$(-\infty, 0]$

#26 The function $f(x) = \frac{6x+7}{5x-6}$ is one-to-one.

(a) Find its inverse and check

(b) Find Dom and Ran of f and f^{-1}

(a) $f(x) = \frac{6x+7}{5x-6}$

(1) $f(x) = y$ $\quad y = \frac{6x+7}{5x-6}$

(2) $x \leftrightarrow y$ $\quad x = \frac{6y+7}{5y-6}$

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§6.2

#29

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	g	g^{-1}
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Range	$[4, \infty)$	$(-\infty, 0]$

#26 The function $f(x) = \dfrac{6x+7}{5x-6}$ is one-to-one.

(a) Find its inverse and check

(b) Find Dom and Ran of f and f^{-1}

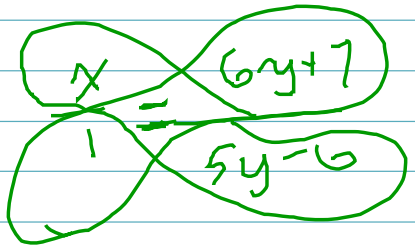
(a) $f(x) = \dfrac{6x+7}{5x-6}$

① $f(x) \to y$ $\quad y = \dfrac{6x+7}{5x-6}$

② $x \leftrightarrow y$ $\quad x = \dfrac{6y+7}{5y-6}$

$$x = \frac{6y+7}{5y-6}$$

(3) Solve for y



$$x(5y-6) = 1(6y+7)$$

$$5xy - 6x = 6y + 7$$

$$5xy - 6y = 6x + 7$$

$$\frac{y(5x-6)}{5x-6} = \frac{6x+7}{5x-6}$$

$$y = \frac{6x+7}{5x-6}$$

(4) $y = f^{-1}(x)$

$$f^{-1}(x) = \frac{6x+7}{5x-6}$$

	$f(x) = \frac{6x+7}{5x-6}$	$f^{-1}(x) = \frac{6x+7}{5x-6}$
Domain	$\{x \mid x \neq \frac{6}{5}\}$	$\{x \mid x \neq \frac{6}{5}\}$
Range	$\{y \mid y \neq \frac{6}{5}\}$	$\{y \mid y \neq \frac{6}{5}\}$

$5x - 6 \neq 0$

$+6 \quad +6$

$\frac{5x}{5} \neq \frac{6}{5}$

$x \neq \frac{6}{5}$

#23 Now You Try!

The function $f(x) = \frac{7}{3+x}$ is one-to-one.

(a) Find its inverse

(b) Find the domain and range of f and f^{-1}.

$$f(x) = \frac{7}{3+x}$$

	$f(x) = \frac{7}{3+x}$	$f^{-1}(x) = \frac{7-3x}{x}$
D	$\{x \mid x \neq -3\}$	$\{x \mid x \neq 0\}$
R	$\{y \mid y \neq 0\}$	$\{y \mid y \neq -3\}$

$3+x \neq 0$

$x \neq -3$

① $f(x) \to y$

$$y = \frac{7}{3+x}$$

② x y

$$x = \frac{7}{3+y}$$

③ Solve for y

$$\frac{x}{1} = \frac{7}{3+y}$$

$$x(3+y) = 1(7)$$

$$3x + xy = 7$$

$$xy = 7 - 3x$$

$$\frac{xy}{x} = \frac{7-3x}{x}$$

$$y = \frac{7-3x}{x}$$

④ $y \to f^{-1}(x)$

$$f^{-1}(x) = \frac{7-3x}{x}$$

#15 Consider the functions $f(x) = -9x+1$ and $g(x) = -\frac{1}{9}(x-1)$.

(a) Find $f(g(x))$

(b) Find $g(f(x))$

(c) Are f and g inverses of each other.

(a) Find

$f(\boxed{g(x)})$

$= f\left(-\frac{1}{9}(x-1)\right)$

$= -9\left(-\frac{1}{9}(x-1)\right) + 1$

$= \frac{-9}{1} \cdot \frac{1}{-9} \cdot (x-1) + 1$

$= x - 1 + 1$

$= \boxed{x}$

SW

$f(x) = -9x+1$

$f(\text{input}) = -9(\text{input}) + 1$

$f\left(-\frac{1}{9}(x-1)\right) = -9\left(-\frac{1}{9}(x-1)\right) + 1$

$f(x) = -9x + 1$

$g(x) = -\frac{1}{9}(x-1)$

(b) Find $g(f(x))$

$= g(-9x+1)$

$= -\frac{1}{9}(-9x+1-1)$

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

$= \frac{1}{-9} \cdot \frac{-9x}{1}$

$= x$

SW

$g(x) = -\frac{1}{9}(x-1)$

$g(\text{input}) = -\frac{1}{9}(\text{input} - 1)$

$g(-9x+1) = -\frac{1}{9}(-9x+1-1)$

(c) Are f and g inverses of each other?

SAME

If $(f \circ g)(x) = x$ and $(g \circ f)(x) = x$

If $f(g(x)) = x$ and $g(f(x)) = x$

Then f and g are inverses

Now You Try!

$f(x) = \frac{3}{4}x + 5$ $\quad$ $g(x) = \frac{4}{3}x - 5$

(a) Find $f(g(x))$

(b) Find $g(f(x))$

(c) Are f and g inverses of each other?

$f(x) = \frac{3}{4}x + 5 \qquad g(x) = \frac{4}{3}x - 5$

(a) Find $f(g(x))$

$= f\left(\frac{4}{3}x - 5\right)$

$= \frac{3}{4}\left(\frac{4}{3}x - 5\right) + 5$

$= \frac{3}{4}\left(\frac{4}{3}x\right) - \frac{3}{4}(5) + 5$

$= \frac{3}{4}\cdot\frac{4}{3}\cdot x - \frac{3}{4}\cdot\frac{5}{1} + 5$

$= x - \frac{15}{4} + 5$

$= x - \frac{15}{4} + \frac{5(4)}{1(4)}$

$= x - \frac{15}{4} + \frac{20}{4}$

$= \boxed{x + \frac{5}{4}}$

SW

$g(x) = \frac{4}{3}x - 5$

$g(\text{input}) = \frac{4}{3}(\text{input}) - 5$

$g\left(\frac{3}{4}x + 5\right) = \frac{4}{3}\left(\frac{3}{4}x + 5\right) - 5$

SW

$f(x) = \frac{3}{4}x + 5$

$f(\text{input}) = \frac{3}{4}\cdot\text{input} + 5$

$f\left(\frac{4}{3}x - 5\right) = \frac{3}{4}\cdot\left(\frac{4}{3}x - 5\right) + 5$

(b) Find $g(f(x))$

$= g\left(\frac{3}{4}x + 5\right)$

$= \frac{4}{3}\left(\frac{3}{4}x + 5\right) - 5$

$= \frac{4}{3}\cdot\frac{3}{4}x + \frac{4}{3}\cdot 5 - 5$

$= \frac{4}{3}\cdot\frac{3}{4}\cdot x + \frac{4}{3}\cdot\frac{5}{1} - \frac{5}{1}$

$= x + \frac{20}{3} - \frac{5(3)}{1(3)}$

$= x + \frac{20}{3} - \frac{15}{3}$

$= \boxed{x + \frac{5}{3}}$

(c) Are f and g inverses?

NO