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6.1
Lecture Notes Page 85.

$g(x) = \sqrt{x-4}$ $\quad f(x) = x^2 + 7$

find $(f \circ g)(x)$ and domain (domain was found last class)

$f(g(x))$

$f(\sqrt{x-4})$

$= (\sqrt{x-4})^2 + 7$ $\quad f(\text{input}) = (\text{input})^2 + 7$

$x - 4 + 7$

$\boxed{(f \circ g)(x) = x + 3}$ Domain of $(f \circ g)$ is $x \geq 4$

find $(g \circ g)(x)$ $\quad g(\text{input}) = \sqrt{(\text{input}) - 4}$

$g(g(x))$ $\quad g(\sqrt{x-4}) = \sqrt{\sqrt{x-4} - 4}$

$\boxed{(g \circ g)(x) = \sqrt{\sqrt{x-4} - 4}}$

6.2 one to one and inverse functions

graph on page 88 in lecture notes

f x	f y	f^{-1} x	f^{-1} y
-5	-5	-5	-5
-4	1	1	-4
1	2	2	1
2	4	4	2

g x	g y	g^{-1} x	g^{-1} y
-5	-5	-5	-5
0	0	0	0
5	5/3	5/3	5
-3	≈ -1.7	≈ -1.7	-3
2	≈ .3	≈ .3	2
3	≈ 0.5	≈ .5	3

03.28.2017 9:58a TR Coll. Alg. Sections 6.1 (Ends) and 6.2 (Start) 3/28/17, 5:59 AM, 1 Stan 25s

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$\boxed{(g \circ g)(x) = \sqrt{\sqrt{x-4} - 4}}$

6.2 one to one and inverse functions

graph on page 88 in lecture notes

f	
x	y
-5	-5
-4	1
1	2
2	4

f^{-1}	
x	y
-5	-5
1	-4
2	1
4	2

g	
x	y
-5	-5
0	0
5	5/3
-3	≈ -1.7
2	$\approx .3$
3	≈ 0.5

g^{-1}	
x	y
-5	-5
0	0
5/3	5
≈ -1.7	-3
$\approx .3$	2
$\approx .5$	3

finding the inverse function from an equation

1) replace f(x) with y
2) turn x's into y's and y's into x's
3) solve for y
4) replace y with $f^{-1}(x)$

- the domain of f is the range of f^{-1}
- the range of f is the domain of f^{-1}

(38) $f(x) = \frac{4x}{3x-7}$ is one to one find it's inverse and domain and range of f and f^{-1}

1. $f(x) \to y$ $\quad y = \frac{4x}{3x-7}$
2. $x \; y$ $\quad x = \frac{4y}{3y-7}$
3. solve for y

$(3y-7)x = \frac{4y}{3y-7}(3y-7)$

$(3y-7)x = 4y$

$3xy - 7x = 4y$

$4y - 3xy$ same

$-7x = -3xy + 4y$

factor out y

$\frac{-7x}{-3x+4} = \frac{y(-3x+4)}{-3x+4}$

flipped $y = \frac{-7x}{4-3x}$

4. $f^{-1}(x) = \frac{-7x}{4-3x}$

(A) $\frac{7x}{3x-4}$ (B) -7 (C) $\frac{7x}{4+3x}$ $\quad \frac{(-7)(x)}{(3x-4)(-1)}$

$f(x)\ \frac{4x}{3x-7}$

Domain $\{x \mid x \text{ is real}, x \neq \frac{7}{3}\}$

Range $\{y \mid y \text{ is real}, y \neq \frac{4}{3}\}$

$f^{-1}(x)\ \frac{-7x}{4-3x}$

Domain $\{x \mid x \text{ is real}, x \neq \frac{4}{3}\}$

Range $\{y \mid y \text{ is real}, y \neq \frac{7}{3}\}$

Side work

$3x - 7 = 0$ $\quad +7 \; +7$

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

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

$4 - 3x = 0$ $\quad -4 \; -4$

$\frac{-3x}{-3} = \frac{-4}{-3}$

$x = \frac{4}{3}$