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* Extra Credit Workshop: March 27, 2018
  Friday 3/30 1-2:15p in 7-256)
* Return work to Students
* Finish §6.1 Composite Functions (pp 82-83)
* Start §6.2 One-to-One Functions;
  Inverse Functions (pp 84-87)
* 7 Days until the Chapter 8 and 6 Test
  (8.1, 8.6, 8.7, 6.1, 6.2)

pp 82 #20 find the domain of the composite function $f \circ g$

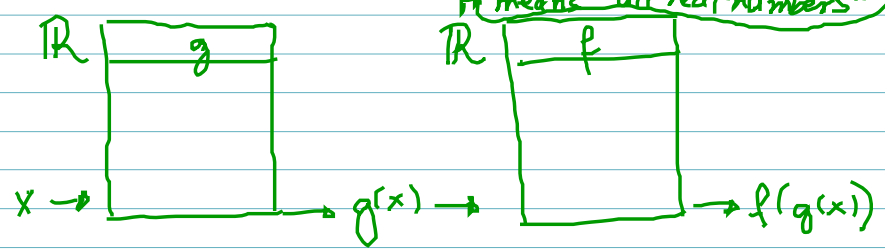
$f(x) = x^2$ $g(x) = x^2+6$

1 Start with $(-\infty, \infty)$

2

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

$\mathbb{R}$ means "all real numbers"



3 Domain of g alone → $\mathbb{R}$ (all real #s)
4 Domain of f alone → $\mathbb{R}$ (all real #s)
5 Domain of $f \circ g$ is $\mathbb{R}$

#24 Given $g(x) = \sqrt{x-4}$, find $(g \circ g)(x)$ and its domain

* Always do the Domain first.
* Find the Domain with a Composite Function is a 5-step process.

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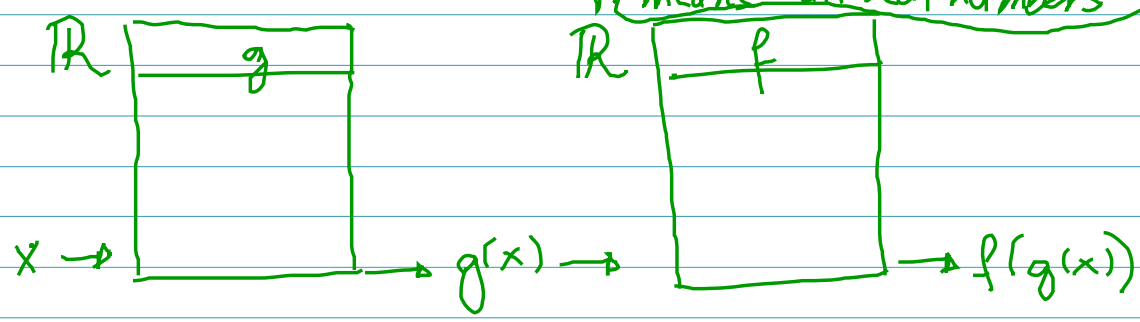

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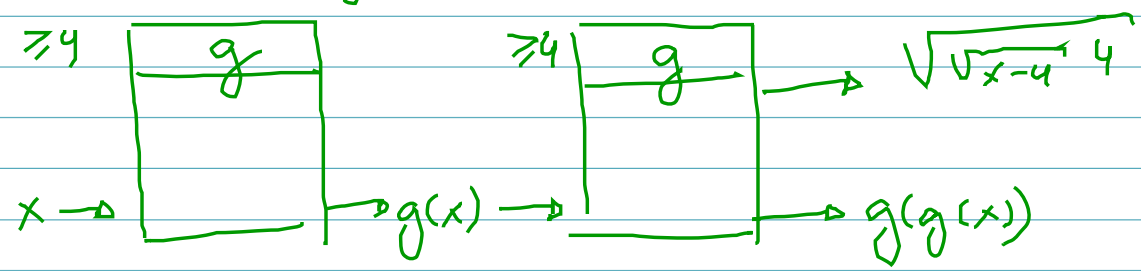
* Find the Domain with a Composite Function is a 5-step process

$\boxed{\text{Domain}}$ → of a composite functions = 5-step-process

$\boxed{1}$ Start with $(-\infty, \infty)$

$\boxed{2}$ Draw the diagram



$\boxed{3}$ → find domain of g alone

$\boxed{4}$ → find domain of g alone

$\boxed{5}$ → $x \geq 4$ and $g(x) \geq 4$ → $\sqrt{x-4} \geq 4$

→ $\boxed{\text{Sidework}}$

Domain of g alone → 4-step-process

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

$\boxed{1}$ Start with $(-\infty, \infty)$

$\boxed{2}$ even $\sqrt{\text{radicand}}$

radicand ≥ 0

$x - 4 \geq 0$

$+4 \quad +4$

$x \geq 4$ $\boxed{\text{and}}$ → $g(x) \geq 4$

to solve this, we must square both sides But this only works if we have positive numbers in both sides

$(\sqrt{x-4})^2 \geq (4)^2$

$x - 4 \geq 16$

$+4 \quad +4$

$x \geq 20$

$\boxed{5}$ $x \geq 4$ and $g(x) \geq 4$

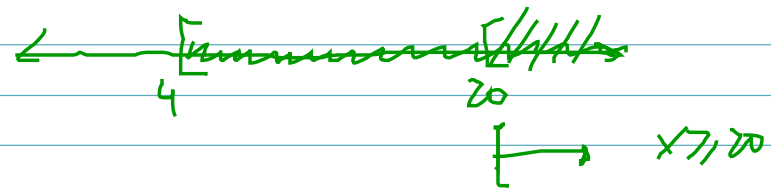
So:

and → $x \geq 20$

$\boxed{\text{Domain of } g \circ g \text{ is } \{x \mid x \geq 20\}}$

→ We don't need the ≥ 4 because if it is ≥ 20, it's obviously ≥ 4.

$x \geq 4$ and $x \geq 20$



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

$g(\text{input}) = \sqrt{\text{input}-4}$

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

cannot be simplified further

$(g \circ g)(x)$

$= g(g(x))$

$g(\underbrace{\sqrt{x-4}}_{\text{input}})$

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

p.84 6.2 → One-to-One Functions ; Inverse functions

12 → No

14 → Yes

$2 \longrightarrow 2$
$3 \longrightarrow 3$
$4 \longrightarrow 42$
$5 \longrightarrow 88$

15 → Yes

p86 # 28 →

$f(x)$

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

$f^{-1}(x)$

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

→ Plot these points in the graph in the Lecture Notes p. 86

#29

$g(x)$	
x	y
-5	-5
5	$\frac{5}{3}$
0	0

$g^{-1}(x)$	
x	y
-5	-5
0	0
$\frac{5}{3}$	5

plot these points in the graphic in the Lecture Notes p. 86

p.87 Inverse of a Function

#67 $f(x) = \frac{4x}{3x-7}$ is one-to-one. Find its inverse.

Steps:

1 $f(x) \to y$ $\to$ $y = \frac{4x}{3x-7}$

2 $x \leftrightarrow y$ $\to$ $x = \frac{4y}{3y-7}$

3 Solve for y $\to$ $\frac{x}{1} = \frac{4y}{3y-7}$

$(3y-7)(x) = (1)(4y)$

$3xy - 7x = 4y$

$-7x = 4y - 3xy$

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

$y = \frac{-7x}{4-3x}$ ← or

$\boxed{4}$ $\boxed{y \to f^{-1}(x)} \longrightarrow f^{-1}(x) = \dfrac{-7x}{4-3x}$

Correct answer D

multiply by -1 $= \dfrac{-7x}{4-3x} \cdot \dfrac{(-1)}{(-1)} = \dfrac{7x}{-4+3x}$

$D = \dfrac{7x}{3x-4}$