6.3 Function Operations and Composition

Power Function: $y = ax^b$

a and b are real numbers

example: $f(x) = 5x^{1/3}$ $\qquad g(x) = -11x^{1/3}$

a) What is the domain of each
function? all real numbers

b) find $f(x) + g(x)$

$$5x^{1/3} + (-11x^{1/3})$$
$$- 6x^{1/3}$$

c) find $f(x) - g(x)$

$$5x^{1/3} - (-11x^{1/3})$$
$$16x^{1/3}$$

d) What is the domain of $f(x) + g(x)$?
$f(x) - g(x)$? all real numbers

example: $f(x) = 8x$ $g(x) = 2x^{5/6}$

a) What is the domain of each function?

$f(x)$ — all real numbers

$g(x)$ — nonnegative real numbers

b) find $f(x) \cdot g(x)$

$$\left(8x\right) \cdot \left(2x^{5/6}\right)$$

$$16x^{11/6}$$

c) find $\dfrac{f(x)}{g(x)}$

$$\frac{8x^1}{2x^{5/6}}$$

$$4x^{1/6}$$

d) What is the domain of $f(x) \cdot g(x)$?
$f(x) / g(x)$?

nonnegative real #'s

positive real #'s
$\left(\begin{array}{l}\text{can't be 0}\\\text{because} \div 0\end{array}\right)$

Composition of Functions:

$g(f(x))$ means to do f first, take that answer and plug into g.

example: $f(x) = 2x$ $g(x) = x - 7$

a) find $g(f(3))$

$$f(3) = 2(3)$$
$$= 6$$

$$g(6) = 6 - 7$$
$$g(f(3)) = -1$$

b) find $f(g(3))$

$$g(3) = 3 - 7$$
$$= -4$$

$$f(-4) = 2(-4)$$
$$f(g(3)) = -8$$

example: $h(x) = 2x + 3$ $j(x) = x^2 + 1$

a) find $j(h(2))$ b) find $h(j(x))$

$h(2) = 2(2) + 3$
$\qquad = 7$

$j(7) = 7^2 + 1$

$j(h(2)) = 50$

$2(x^2 + 1) + 3$

$2x^2 + 2 + 3$

$h(j(x)) = 2x^2 + 5$

c) find $j(h(x))$

$(2x+3)^2 + 1$

$4x^2 + 12x + 9 + 1$

$4x^2 + 12x + 10$

Domain????

example: $f(x) = \dfrac{1}{x}$ $g(x) = x - 7$

a) find $g(f(x))$

b) find $f(g(x))$

Domain????

Lets look at it another way.

x	f(x)
1	2
2	3
19	20
20	21

X   X+1

x	g(x)
1	5
2	10
3	15
4	20
5	25

x   5x

Find g(f(1))

g(2)

10

Find f(g(1))

f(5)

6

Find f(g(4)) = 21

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