

Chapter 1

Section 8

Composition of Functions

OPERATIONS:

- ▶ ADD: $(f + g)(x) = f(x) + g(x)$
- ▶ SUBTRACT: $(f - g)(x) = f(x) - g(x)$
- ▶ PRODUCT: $(f \cdot g)(x) = f(x) \cdot g(x)$
- ▶ QUOTIENT: $(f/g)(x) = f(x)/g(x)$
 - Must find the domains for quotient

Examples:

$$1.) f(x) = 2x + 1$$

$$g(x) = -3x + 4$$

$$(f+g)(x) = 2x + 1 + -3x + 4$$
$$\boxed{= -x + 5}$$

$$(f-g)(x) = 2x + 1 - (-3x + 4)$$
$$= 2x + 1 + 3x - 4$$
$$\boxed{= 5x - 3}$$

$$(f \cdot g)(x) = (2x + 1)(-3,$$

$$-6x^2 + 8x + 3x + 4$$
$$\boxed{= -6x^2 + 5x + 4}$$

$$(f/g)(x) = \frac{2x + 1}{-3x + 4}$$
$$\boxed{x \neq 4/3}$$

$$-3x + 4 \neq 0$$
$$-3x \neq -4$$
$$x \neq 4/3$$

Examples

$$(f \cdot g)(x) = (x^2 + 4)(5x - 2)$$

$$5x^3 - 2x^2 + 20x - 8$$

2.) $f(x) = x^2 + 4$

$$g(x) = 5x - 2$$

$$(f+g)(x) = x^2 + 4 + 5x - 2$$

$$x^2 + 5x + 2$$

$$(f-g)(x) = x^2 + 4 - (5x - 2)$$

$$x^2 + 4 - 5x + 2$$

$$x^2 - 5x + 6$$

$$(f/g)(x) = \frac{x^2 + 4}{5x - 2}$$

$$x \neq 2/5$$

$$5x^2 \neq 0$$

$$5x \neq 2$$

$$x \neq 2/5$$

Examples

$$3.) f(x) = -2x - 4$$

$$g(x) = 3x$$

$$(f + g)(-2) =$$

$$-2x - 4 + 3x$$

$$x - 4$$

$$\hline -2 - 4 = \boxed{-6}$$

$$(f \cdot g)(3) = (-2x - 4) 3x$$

$$-6x^2 - 12x$$

$$-6(3)^2 - 12(3)$$

$$-54 - 36 = \boxed{-90}$$

$$-2(-2) - 4 +$$

~~$$+ 4 + -$$~~

$$\boxed{-6}$$

$$(-2(3) - 4)(3)$$

$$-10 \cdot 9$$

$$\boxed{-90}$$

COMPOSITIONS

- $f(x) = x^2 - 1$
- $f(2) = (2)^2 - 1$
- $f(g(x)) = (g(x))^2 - 1$

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

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

EXAMPLES-composition

1.) $f(x) = 2x + 1$

$g(x) = -3x + 4$

$$(f \circ g)(x) = 2(-3x+4) + 1$$

$$= -6x + 8 + 1$$

$$= \boxed{-6x + 9}$$

$$(g \circ f)(x) = -3(2x+1) + 4$$

$$= -6x - 3 + 4$$

$$= \boxed{-6x + 1}$$

2.) $f(x) = x^2 + 4$

$g(x) = 5x - 2$

$$(f \circ g)(x) = (5x-2)^2 + 4$$

$$= 25x^2 - 10x + 4 + 4$$

$$= \boxed{25x^2 - 10x + 8}$$

$$(g \circ f)(x) = 5(x^2 + 4) - 2$$

$$= 5x^2 + 20 - 2$$

$$= \boxed{5x^2 + 18}$$

Classwork



Pg 89 # 5, 8, 13, 14, 31-34

Pg 90 # 55-59, 65

Homework



Pg 89 # 6,7,15-17,
20, 21, 35-37, 40, 41,
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