

Review:

1. Graph:

$$p(x) = \begin{cases} x, & \text{if } x < 2 \\ |x - 2|, & \text{if } x = 2 \\ x + 1, & \text{if } 2 < x < 5 \\ -1, & \text{if } x \geq 5 \end{cases}$$

2. Odd, even, or neither? Show your work, leave no ().

$$a) f(x) = -\frac{2x}{\sqrt{5+x^2}} \qquad b) g(x) = 3x^3 + x - 2$$

3. Find the domain in interval notation:

$$f(x) = \frac{3x}{\sqrt{9-x^2}}$$

Sec. 1.7 Arithmetic Combinations of Functions

4 Basic Operations:

Given $f(x)$ and $g(x)$:

Sum: $(f + g)(x) = f(x) + g(x)$

Difference: $(f - g)(x) = f(x) - g(x)$

Product: $(fg)(x) = f(x)g(x)$

Quotient: $\frac{f}{g}(x) = \frac{f(x)}{g(x)}$, provided $g(x) \neq 0$.

Ex. 1: If $f(x) = 2x + 6$ and $g(x) = x^2 + 5x + 6$
find:

a) $(f - g)(x)$

a) $(f - g)(0)$

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

$$g(x) = x^2 + 5x + 6$$

$$c) \frac{f}{g}(x)$$

$$d) \frac{f}{g}(-3)$$

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

$$g(x) = x^2 + 5x + 6$$

$$\text{e) } \frac{f}{g}(0)$$

Sec. 1.7 Composite Functions

$(f \circ g)(x) = f(g(x))$: Read as “*f of g(x)*”

Means: all of the x 's in the f function are replaced by the **equation** of $g(x)$

Vice versa for $(g \circ f)(x)$.

Finding the Domain

For Operations: $+$, $-$, \times , \div

The domain comes from *all* the functions involved and the result.

For Composition: $f \circ g$ & $g \circ f$

The overall domain includes both the **result's** and the **"inside"** function's domain restrictions. NOT THE OUTSIDE FUNCTION!

Ex.1: If $f(x) = \frac{2}{x+3}$ and $g(x) = \frac{1}{x}$

Find $f \circ g$ and its domain.

Ex. 2: If $f(x) = \sqrt{x}$ and $g(x) = x^2 + 3$,

a) Find $g \circ f$ and its domain.

b) Find $g \circ f(4)$

c) Find $g \circ f(-1)$

Ex. 3: If $f(x) = \frac{1}{x}$ and $g(x) = \frac{1}{2x+1}$,

Find $f \circ g$ and its domain.