Adding & Subtracting Functions

- We add & subtract functions *exactly* how we add & subtract polynomials. Simply combine like terms.

Adding & Subtracting Polynomials	Adding & Subtracting Functions
$x^2 + 4$ $+\ (5x + 7)$ ____________	$f(x) = x^2 + 4$ $g(x) = 5x + 7$ ____________ $f(x) + g(x) =$

Note: You may also see $f(x) + g(x)$ written as ____________ and $f(x) - g(x)$ written as ____________.

- Domain of $f + g$ or $f - g$ is all the numbers that are ____________ between the domains of $f \& g$ independently.

EXAMPLE: Given the functions, $f(x) = x^2 + \frac{1}{x}$, $g(x) = x^2 + x + 2$, $h(x) = x + \sqrt{x - 8}$, complete the following operations below. Determine the domain of each new function.

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

$g(x) - h(x) =$

Domain of f: __________

Domain of g: __________

Domain of $(f + g)$: __________

Domain of g: __________

Domain of h: __________

Domain of $(g - h)$: __________

PROBLEM: If $\boldsymbol{f(x) = \sqrt{x+4} + 30}$ and $\boldsymbol{g(x) = \sqrt{x+4} - 2x + 35}$ complete the following operation below. Determine the domain of the new function.

$(\boldsymbol{A})$

$(\boldsymbol{f} + \boldsymbol{g})(\boldsymbol{x})$ =

$(\boldsymbol{B})$

$(\boldsymbol{f} - \boldsymbol{g})(\boldsymbol{x})$ =

Multiplying And Dividing Functions

- You may be asked to multiply or divide functions and find the __________ of the resulting function.

Multiplying Functions	Dividing Functions
$f(x) = \sqrt{x}$ Dom: [___, ___) $g(x) = (3x - 6)$ Dom: (___, ___) $f(x) \cdot g(x) =$ Dom: [___, ___) Domain: Set of numbers *common* to domains of f & g	$f(x) = \sqrt{x}$ Dom: [___, ___) $g(x) = (3x - 6)$ Dom: [___, ___) $\frac{f(x)}{g(x)} =$ Dom: [___, ___)∪(___, ___) Domain: Set of numbers *common* to domains of f & g AND where $g(x) \neq$ ___

Note: You may also see $f(x) \cdot g(x)$ written as ____________ and $\frac{f(x)}{g(x)}$ written as ____________.

EXAMPLE: Given the functions, $f(x) = x^2 - 4$, $g(x) = x + 2$, complete the following operations below, and determine the domain of the new function.

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

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

- Always determine the domain restrictions __________ simplifying the functions.

PRACTICE: Given the functions $h(x) = 2x^3 - 4$ and $k(x) = x^2 + 2$, find and fully simplify $h \cdot k(x)$.

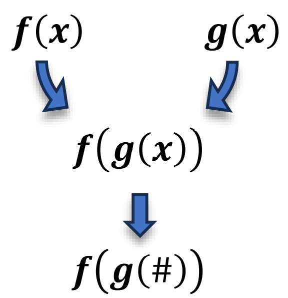
PRACTICE: Given the functions $L(x) = x - 2$ and $M(x) = x^2$, calculate $\frac{L}{M}(5)$.

Evaluating Composed Functions

- You may have to compose functions and ***then*** ____________ at a specific value, $f(g(\#))$. Two common methods:

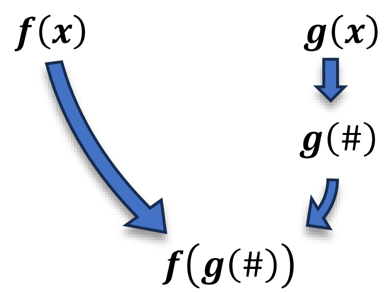
Method 1: Compose → Evaluate

Use when first asked to find $f(g(x))$



EXAMPLE: For $f(x) = x^2$ and $g(x) = x - 1$, find $f(g(x))$ and then evaluate $f(g(3))$

Method 2: Evaluate inside → Evaluate outside



EXAMPLE: For $f(x) = x^2$ and $g(x) = x - 1$, evaluate $f(g(3))$

PRACTICE: Given the functions $f(x) = x + 3$ and $g(x) = x^2$, (A) find $(f \circ g)(2)$ and (B) $(g \circ f)(2)$.