

Adding & Subtracting Functions

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

Adding & Subtracting Polynomials	Adding & Subtracting Functions
$\begin{array}{r} x^2 + 4 \\ + (5x + 7) \\ \hline \end{array}$	$\begin{array}{r} f(x) = x^2 + 4 \\ g(x) = 5x + 7 \\ \hline f(x) + g(x) = \end{array}$

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 g : _____

Domain of h : _____

Domain of $(f + g)$: _____

Domain of $(g - h)$: _____

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

(A)

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

(B)

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

Multiplying And Dividing Functions

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

Multiplying Functions	Dividing Functions
$f(x) = \sqrt{x}$ <i>Dom:</i> [__, __] $g(x) = (3x - 6)$ <i>Dom:</i> (__, __)	$f(x) = \sqrt{x}$ <i>Dom:</i> [__, __] $g(x) = (3x - 6)$ <i>Dom:</i> [__, __]
$f(x) \cdot g(x) =$ <i>Dom:</i> [__, __]	$\frac{f(x)}{g(x)} =$ <i>Dom:</i> [__, __) \cup (__, __]
Domain: Set of numbers <u>common</u> to domains of f & g	Domain: Set of numbers <u>common</u> to domains of f & g AND where $g(x) \neq \underline{\hspace{1cm}}$

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.

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

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

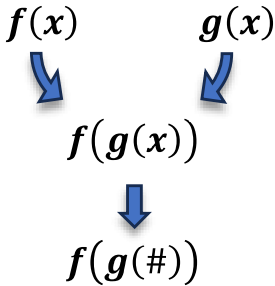
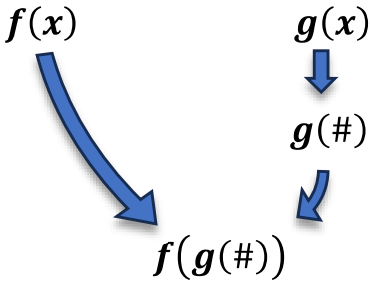
- Always determine the domain restrictions _____ simplifying the functions.

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 \rightarrow Evaluate <i>Use when first asked to find $f(g(x))$</i>	Method 2: Evaluate inside \rightarrow Evaluate outside
 <p>The diagram illustrates the 'Compose then Evaluate' method. It shows two functions, $f(x)$ and $g(x)$, at the top. Arrows from both point down to the composition $f(g(x))$. A second arrow points down from $f(g(x))$ to $f(g(\#))$.</p>	 <p>The diagram illustrates the 'Evaluate inside then Evaluate outside' method. It shows $f(x)$ and $g(x)$ at the top. An arrow from $g(x)$ points down to $g(\#)$. Another arrow from $f(x)$ points down to $f(g(\#))$, passing by $g(\#)$.</p>
<u>EXAMPLE:</u> For $f(x) = x^2$ and $g(x) = x - 1$, find $f(g(x))$ and then evaluate $f(g(3))$	<u>EXAMPLE:</u> 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**) $(g \circ f)(2)$.