L3 – 8.1/8.2 Sum/Difference and Product/Quotient of Functions
MHF4U

Part 1: Sum and Difference of Functions

When two functions $f(x)$ and $g(x)$ are combined to form the function $(f+g)(x)$ or $(f-g)(x)$, the new function is called the sum or difference of f and g.

The graph of $f+g$ or $f-g$ can be obtained by adding or subtracting corresponding y-coordinates. This is called the s***uperposition principle***.

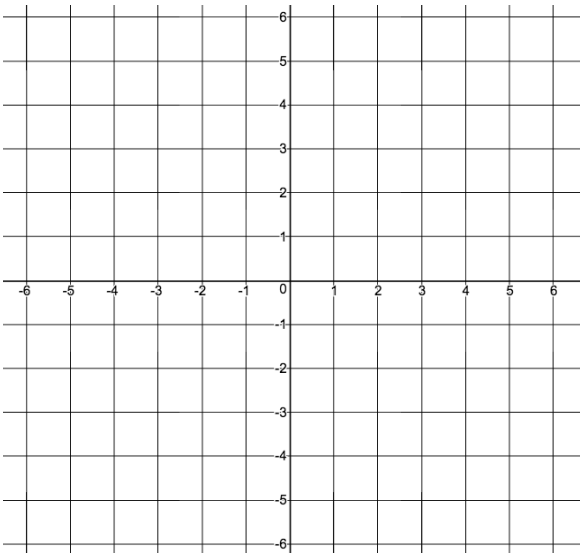
$$(f+g)(x) = f(x) + g(x)$$

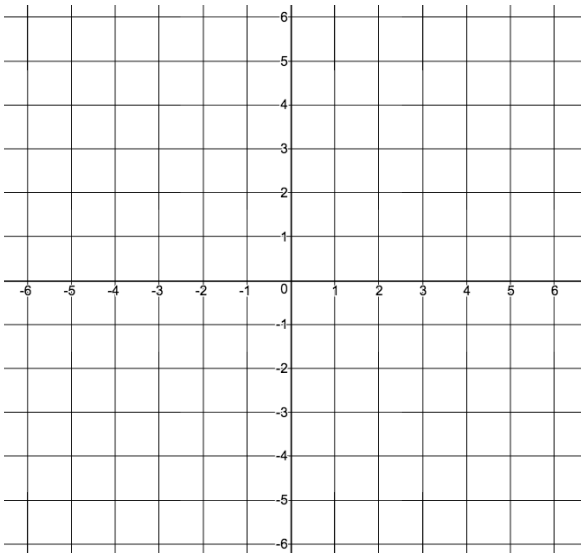
$$(f-g)(x) = f(x) - g(x)$$

Example 1: Given $f(x) = -x^2 + 3$ and $g(x) = -2x$ determine the graphs of $(f+g)(x)$ and $(f-g)(x)$.

Method 1: Graphically

x	$f(x)$	$g(x)$	$f(x)+g(x)$	$f(x)-g(x)$
-3				
-2				
-1				
0				
1				
2				
3				

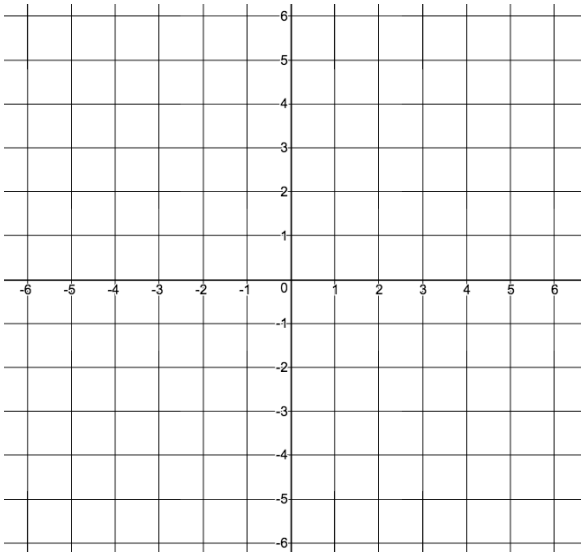


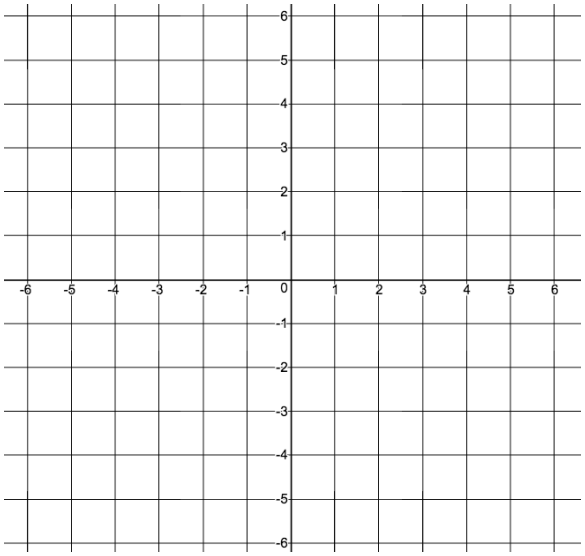


Method 2: Algebraically

x	$(f+g)(x)$

x	$(f-g)(x)$





Note: *The domain of the sum or difference of functions is the intersection of the domains of f and g*

Part 2: Product and Quotient of Functions

When two functions $f(x)$ and $g(x)$ are combined to form the function $(f \cdot g)(x)$ or $(f \div g)(x)$, the new function is called the product or quotient of f and g.

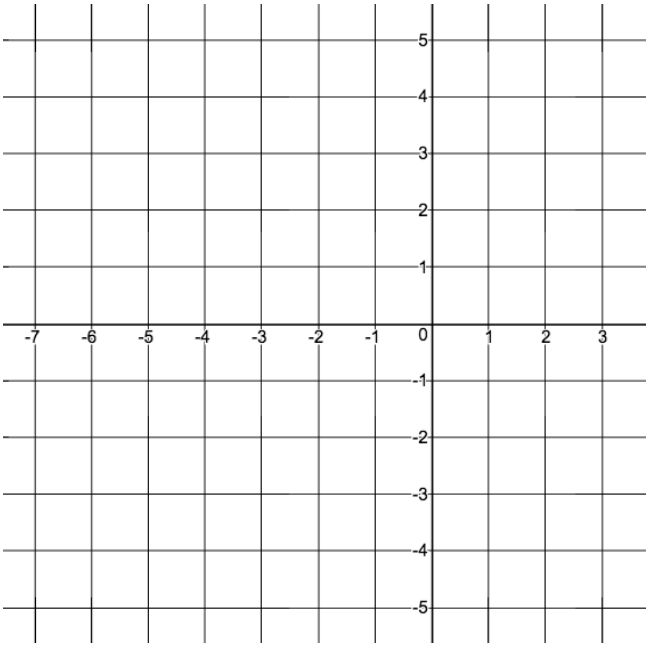
The graph of $f \cdot g$ or $f \div g$ can be obtained by multiplying or dividing corresponding y-coordinates.

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

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

Example 2: Let $f(x) = x + 3$ and $g(x) = x^2 + 8x + 15$. Determine an equation and graph for

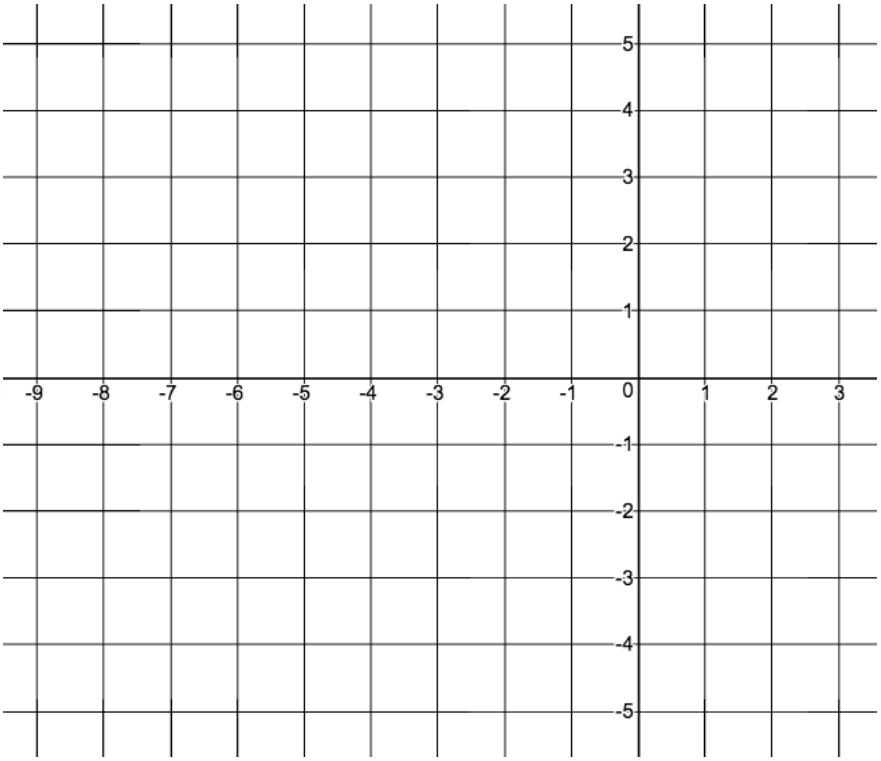
a) $(f \times g)(x)$



b) $(f \div g)(x)$

x	y

x	$\frac{1}{y}$



c) State the domain and range of both functions