C12 - 10.0 - Function Operations Review

Operations

$f(x) + g(x) = (f + g)(x)$ $\quad Add\ y-values$

$f(x) - g(x) = (f - g)(x)$ $\quad Subtract\ y-values$

$f(x) \cdot g(x) = (fg)(x)$ $\quad Multiply\ y-values$

$\frac{f(x)}{g(x)} = \left(\frac{f}{g}\right)(x)$ $\quad Divide\ y-values$

Pick an x-value to talk about. We aren't talking about another x-value till were done talking about that x-value.

Composite Functions

$f\ o\ g(x) = f\big(g(x)\big)$ $\quad Put\ g(x)\ into\ f's\ x$

$g\ o\ f(x) = g\big(f(x)\big)$ $\quad Put\ f(x)\ into\ g's\ x$

Inverse

$y = 2x + 4$

$x = 2y + 4$ $\quad Switch\ x\ and\ y$

$x - 4 = 2y$

$\frac{x}{2} - 2 = y$ $\quad Algebra$

$y = \frac{1}{2}x - 2$ $\quad Solve\ for\ y =$

Check your answer $\quad f\big(g(x)\big) = x$ $\quad g\big(f(x)\big) = x$

Remember: If you put $g(x)$ into $f's\ x$, and if you put $f(x)$ into $g's\ x$, both should solve to x.

T

C12 - 10.1 - Function Notation Notes

$y = f(x) = y$

$f(x) = x + 2$

$y = x + 2$

$y(3) = 3 + 2$

$f(3) = ?$ $(3, y)$ *What is y when x is 3. Put 3 in for x.*

$f(x) = x + 2$
$f(3) = 3 + 2$
$f(3) = 5$ $(3,5)$ *Put whatever is inside the brackets in for x.*

x	y
3	5

$f(x) = x + 2$

$f(x) = 6$ $(x, 6)$ *What is x when y is 6. Put 6 in for f(x).* $x = ?$

$y = x + 2$
$6 = x + 2$
$-2 \quad -2$
$4 = x$
$x = 4$

$f(x) = x + 2$
$6 = x + 2$
$-2 \quad -2$
$4 = x$
$x = 4$ $(4,6)$ *Put whatever f(x) is equal to in for f(x).*

x	y
4	6

$f(x + 5) = ?$

$f(x) = x + 2$
$f(x + 5) = (x + 5) + 2$
$f(x + 5) = x + 7$

Put $x + 5$ in for f's x

$f(3x) = ?$

$f(x) = x + 2$
$f(3x) = (3x) + 2$
$f(3x) = 3x + 2$

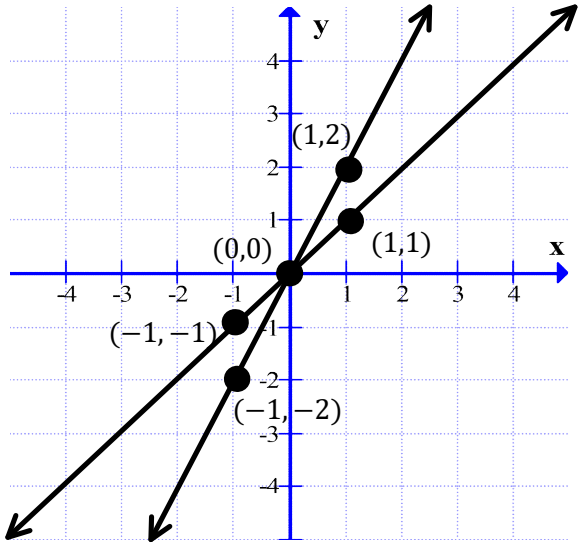
Put $3x$ in for f's x

$f(x)$ does not mean $f \times x$
$f(x)$ is one thing
We dont divide by any part of $f(x)$ or $f(\#)$
Cant Distribute/Factor in/out of a function $f(x)$

$g(x) = y = f(x)$

C12 - 10.1 - Operation Graphs Notes

$f(x) = 2x$ $g(x) = x$



$f(x) = 2x$

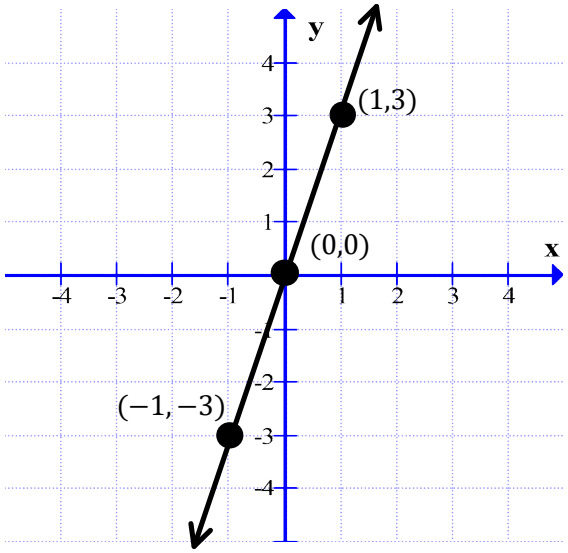
x	f(x)
-1	-2
0	0
1	2

$g(x) = x$

x	g(x)
-1	-1
0	0
1	1

Find $h(x) = f(x) + g(x)$.

$h(x) = 3x$



$h(x) = f(x) + g(x)$
$= (2x) + (x)$
$h(x) = 3x$

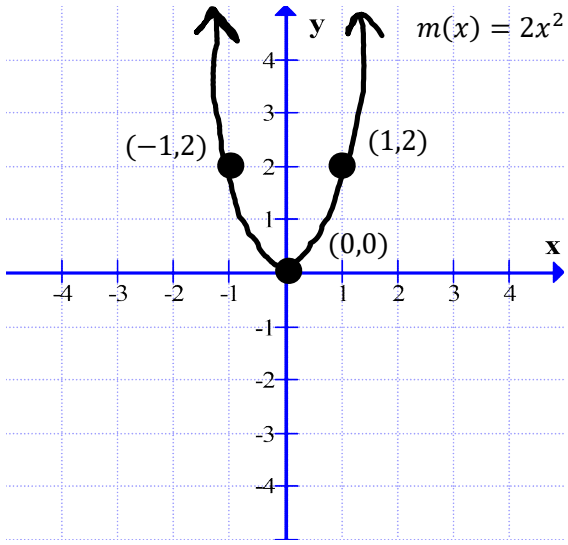
x	f(x)	g(x)	f(x)+g(x)
-1	-2	-1	-3
0	0	0	0
1	2	1	-3

Add $y-$ *values*

Pick an x value
Add the $y-$ *values of* $f(x)$ *and* $g(x)$
Draw the new point.

Find $m(x) = f(x)g(x)$

$m(x) = 2x^2$



$m(x) = f(x)g(x)$
$= (2x)(x)$
$m(x) = 2x^2$

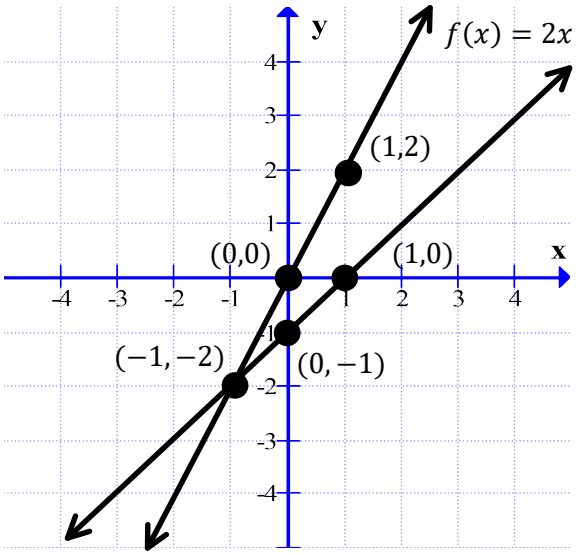
x	f(x)	g(x)	f(x)×g(x)
-1	-2	-1	2
0	0	0	0
1	2	1	2

Multiply $y-$ *values*

Pick an x value
Multiply the $y-$ *values of* $f(x)$ *and* $g(x)$
Draw the new point.

$g(x) = y = f(x)$

C12 - 10.1 - Composit Graphs Notes



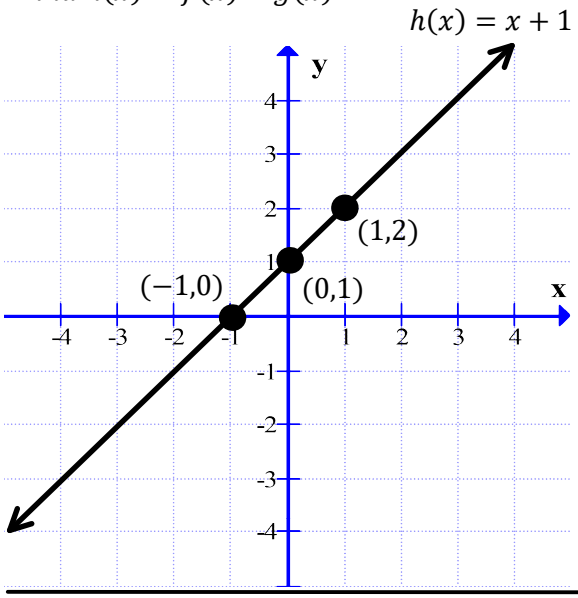
$f(x) = 2x$

x	f(x)
-1	-2
0	0
1	2

$g(x) = x - 1$

x	g(x)
-1	-2
0	-1
1	0

Find $h(x) = f(x) - g(x)$.



$h(x) = f(x) - g(x)$
$= (2x) - (x - 1)$
$h(x) = 2x - x + 1$
$h(x) = x + 1$

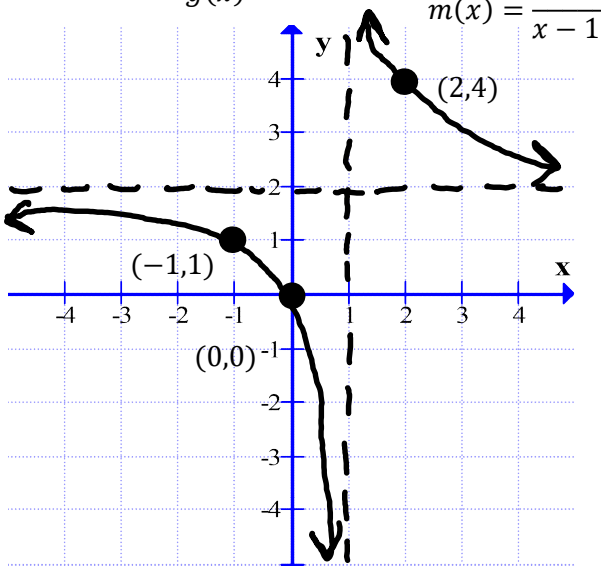
Substitute with brackets.
Distribute a negative

x	f(x)	g(x)	f(x)-g(x)
-1	-2	-2	0
0	0	-1	1
1	2	0	2

Subtract $y - values$

Pick an x value
Subtract the $y - values$ *of* $f(x)$ *and* $g(x)$
Draw the new point.

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



$m(x) = \frac{f(x)}{g(x)}$
$= \frac{2x}{x+1}$

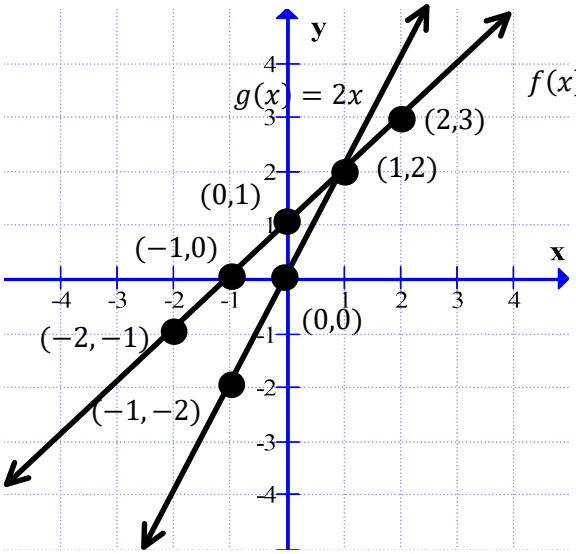
Divide $y - values$

x	f(x)	g(x)	f(x)÷g(x)
-1	-2	-2	1
0	0	-1	0
1	2	0	Und
2	4	1	4

Pick an x value
Divide *the* $y - values$ *of* $f(x)$ *and* $g(x)$
Draw the new point.

C12 - 10.2 - Composite Function Notes

outside(inside)



$f(x) = x + 1$

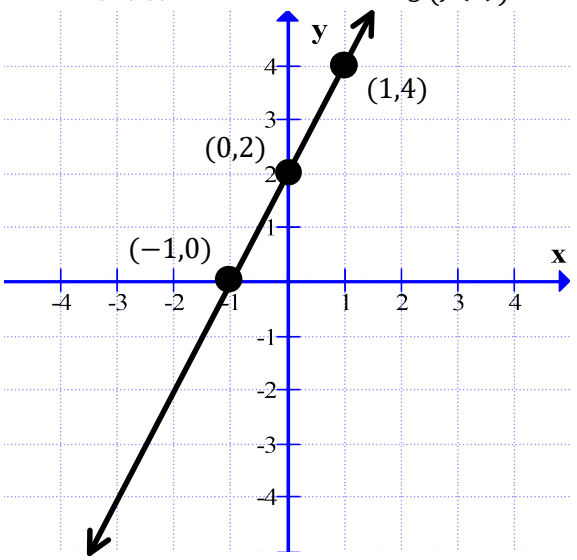
x	f(x)
-1	0
0	1
1	2

$g(x) = 2x$

x	g(x)
-1	-2
0	0
1	2

Find $g(f(x))$?

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



$g(x) = 2x$

$g(f(x)) = 2f(x)$

$g(x + 1) = 2(x + 1)$

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

Outside Function

Put $f(x)$ *into* g*'s* x.

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

x	f(x)
-1	0
0	1
1	2

→

f(x)	g(f(x))
0	0
1	2
2	4

$g(-1) = 0$

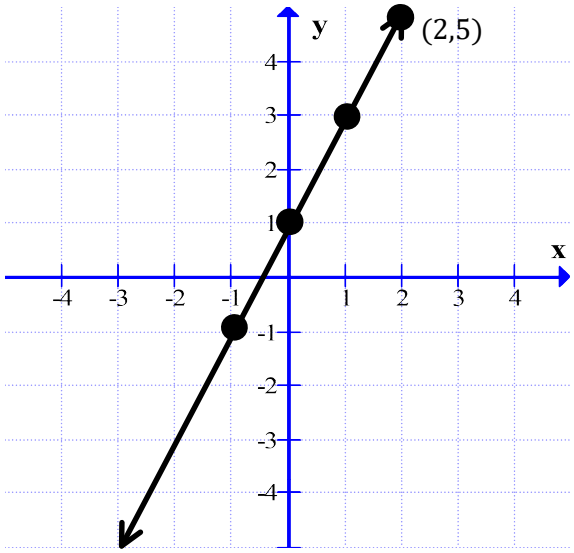
$g(0) = 2$

$g(1) = 4$

x	g(f(x))
-1	0
0	2
1	4

Find $f(g(x))$?

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



$f(x) = x + 1$

$f(g(x)) = g(x) + 1$

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

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

Outside Function

Put $g(x)$ *into* f*'s* x.

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

Find $f(g(2))$.

$g(x) = 2x$

$g(2) = 2(2)$

$g(2) = 4$

Find $g(2)$

Find $f(4)$

$f(x) = x + 1$

$f(4) = 4 + 1$

$f(4) = 5$

$f(g(2)) = 5$ → (2,5)

OR

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

$f(g(2)) = 2(2) + 1$

$f(g(2)) = 5$

Find $f(g(x))$

Put 2 in for x

C12 - 10.2 - Composite Function Notes

$outside(inside)$

Find $f(x)$ *and* $g(x)$ *if*:

$f(g(x)) = (x-1)^2$ $\quad g(x) = ?$ $\quad f(x) = ?$

$outside(inside)$

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

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

$g(x) = inside$ $\quad f(x) = outside$ $\quad f(x-1) = (x-1)^2$

Or

$g(x) = x$ $\quad f(x) = (x-1)^2$ cheeky

$f(g(x)) = x^2 - 6x + 9$

$f(g(x)) = (x-3)(x-3)$

$f(g(x)) = (x-3)^2$ $\quad g(x) = x-3$ $\quad f(x) = x^2$

$f(g(x)) = x^2 - 6x + 13$

$f(g(x)) = (x-3)^2 + 4$ $\quad g(x) = x-3$ $\quad f(x) = x^2 + 4$
