

Functions

Operations

- $(f + g)(x) = f(x) + g(x)$
- $(f - g)(x) = f(x) - g(x)$
- $(f \cdot g)(x) = f(x) \cdot g(x)$
- $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, g(x) \neq 0$
- $(f \circ g)(x) = f(g(x))$ – COMPOSITE FUNCTION

Domains: Consist of the x – values that are in the domains for *both* f and g . Also, the domain of the quotient function does not contain any x – value for which $g(x) = 0$.

Examples:

- Let $f(x) = 5x^3 + 1$ and $g(x) = x^2 - 4$. What are $f + g$ and $f - g$? What are the domains?
- Let $f(x) = x^2 + x - 6$ and $g(x) = x - 2$. What are $f \cdot g$ and $\frac{f}{g}$ and their domains?
- Let $f(x) = x^2 + 1$ and $g(x) = x - 2$. What is $(g \circ f)(-2)$?
- For same functions in previous example, find $(f \circ g)(x), g(f(x)), (f \circ f)(3)$

Inverses

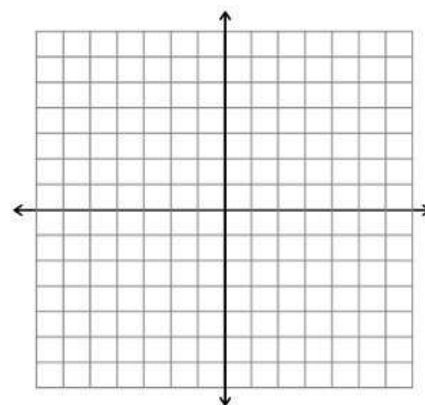
- If a relation pairs element a of its domain to element b of its range, the **inverse relation** pairs b with a . So, if (a, b) is an ordered pair of a relation, then (b, a) is an ordered pair of its inverse.
- The graphs of a relation and its inverse are *reflections* of each other in the line $y = x$.
- How to determine if an expression has an inverse? How to verify two functions are inverses?
 - A 1-1 function has an inverse that is also a function.
 - Horizontal Line Test (for every y there is exactly one x)
 - $f(g(x)) = x$ and $g(f(x)) = x$ if the two functions are inverses of each other.
 - If f and f^{-1} are inverse functions, then $(f^{-1} \circ f)(x) = x$ and $(f \circ f^{-1})(x) = x$ for x in the domain of f and f^{-1} , respectively.
- To determine inverse of a function:
 - Replace $f(x)$ with y , if needed.
 - Switch x and y .
 - Solve for “new” y . This is your inverse function $f^{-1}(x)$. “ f inverse” “inverse of f ”

Examples

- Relation v

x	-2	-1	0	1
y	2	0	3	0

- What is the inverse of relation v ?
- What are the graphs of v and its inverse?



- What is the inverse of the relation described by $y = 5x^2 + 2$?

- Consider the function $g(x) = -\frac{2}{3}x + 7$.
 - What is the g^{-1} , the inverse of g ?

- For $h(x) = \frac{3}{2-x}$, what is each of the following?
 - $h^{-1}(x)$
 - $(h \circ h^{-1})(2)$
 - $(h^{-1} \circ h)(2)$