7-3 Function Operations

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std. 24.0

ex. 1 Let $f(x) = 3x^{1/2}$ ($3\sqrt{x}$), $g(x) = 2x^{1/2}$ ($2\sqrt{x}$)

$f(x) + g(x) =$ $5x^{1/2}$

domain: $x \geq 0$ (x is nonnegative)

$f(x) \cdot g(x) =$ $3x^{1/2} \cdot 2x^{1/2} = 6x$

domain: $x \geq 0$

ex. 2 Let $f(x) = x + 5$, $g(x) = x^2 - 25$

$f(x) - g(x) =$ $(x+5) - (x^2 - 25) = -x^2 + x + 30$

domain: all real #s

$\frac{f(x)}{g(x)} =$ $\frac{x+5}{(x+5)(x-5)} = \frac{1}{x-5}$

domain: $x \neq 5, -5$

Composition of Functions $f(g(x))$ "f of g of x"

$x \rightarrow g(x) \rightarrow f(\ )$ $(f \circ g)(x)$

ex. 3 Let $f(x) = x^{-1}$, $g(x) = x + 1$

(R innermost of composition)

$f(g(x)) =$ $f(x+1) = (x+1)^{-1} = \frac{1}{x+1}$

domain: $x \neq -1$

$g(f(x)) =$ $g(x^{-1}) = \frac{1}{x} + 1$

domain: $x \neq 0$

$f(f(x)) =$ $f(x^{-1}) = (x^{-1})^{-1} = x$

domain: $x \neq 0$