What you'll Learn About

$f(x) = 4x + 1$ and $g(x) = (x + 3)^2$

Find the formulas for the following and the domain of each

a) $f+g$ b) $f-g$ c) fg

$(x+3)^2$

$(x+3)(x+3)$

x^2+6x+9

a) $f(x)+g(x) = 4x+1+(x+3)^2 = x^2+10x+10$ $D:(-\infty,\infty)$

b) $f(x)-g(x) = 4x+1-(x^2+6x+9) = -x^2-2x-8$ $D:(-\infty,\infty)$

$4x+1-x^2-6x-9$

c) $f(x)\,g(x) = (4x+1)(x^2+6x+9)$

$4x^3+24x^2+36x$
x^2+6x+9
$4x^3+25x^2+42x+9$
$D:(-\infty,\infty)$

$\sqrt{x-6}$

$x-6 \geq 0$

$x \geq 6$

$f(x) = \sqrt{x-6}$ $[6,\infty)$ and $g(x) = \cos x$ $(-\infty,\infty)$

Find the formulas for the following and the domain of each

a) $f+g$ b) $f-g$ c) fg

a) $f(x)+g(x) = \sqrt{x+6}+\cos x$ $D:[6,\infty)$

b) $f(x)-g(x) = \sqrt{x+6}-\cos x$ $D:[6,\infty)$

c) $f(x)\,g(x) = (\sqrt{x+6})(\cos x)$ $D:[6,\infty)$

$[2,\infty)$ $(-\infty,\infty)$

$f(x) = \sqrt{x-2}$ and $g(x) = x^3$

Find the formulas for the following and the domain of each

a) f/g b) g/f

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

$\frac{\sqrt{x-2}}{x^3}$ $\frac{x^3}{\sqrt{x-2}}$

D: $[2,\infty)$ D: $(2,\infty)$

$(-\infty,2]$ $(-\infty,\infty)$

$f(x) = \sqrt{8-x^3}$ and $g(x) = x^2$

$8-x^3 \geq 0$

$8 \geq x^3$

$x^3 \leq 8$

$x \leq 2$

Find the formulas for the following and the domain of each

a) f/g b) g/f

$\frac{x^2}{\sqrt{8-x^3}}$

$\frac{\sqrt{8-x^3}}{x^2}$

D: $(-\infty,2)$

$(-\infty,0) \cup (0,2]$

Composite Function

$f \circ g$ → "F circle g"

$f(g(x))$ → "F of g of x"

Plug x = 2 in g. That answer plug in to f

$f(x) = 4x + 2$ and $g(x) = x - 4$

a) $(f \circ g)(2)$

$g(2) = (2) - 4$

$= -2$

$f(-2) = 4(-2) + 2$

$= -6$

$(f \circ g)(2) = -6$

$f(g(2)) = -6$

b) $(g \circ f)(-3)$

$f(-3) = 4(-3) + 2$

$= -10$

$g(-10) = -10 - 4$

$= -14$

$(g \circ f)(-3) = -14$

$f(x) = \frac{2x}{5x+3}$ and $g(x) = x^2 - 4$

a) $(f \circ g)(1) = \frac{1}{2}$

$g(1) = 1^2 - 4$

$= -3$

$f(-3) = \frac{2(-3)}{5(-3)+3}$

$= \frac{-6}{-12} = \frac{1}{2}$

b) $(g \circ f)(-3)$

$f(-3) = \frac{1}{2}$

$g(\frac{1}{2}) = (\frac{1}{2})^2 - 4$

$= \frac{1}{4} - 4$

$= \frac{-15}{4}$

$(-\infty,\infty)$ $x \neq 2$ $(-\infty,2)\cup(2,\infty)$

$f(x) = x^2 + 2$ and $g(x) = \dfrac{3}{x-2}$

Find each of the following and state the domain of each

a) f(g(x))

$f\left(\frac{3}{x-2}\right) = x^2 + 2$

$= \left(\frac{3}{x-2}\right)^2 + 2$

$(-\infty,2)\cup(2,\infty)$

b) g(f(x))

$g(x^2+2) = \dfrac{3}{x-2}$

$= \dfrac{3}{x^2+2-2}$

$= \dfrac{3}{x^2}$

$(-\infty,0)\cup(0,2)\cup(2,\infty)$

$(-\infty,\infty)$ $[0,\infty)$

$f(x) = x^2 - 1$ and $g(x) = \sqrt{x}$

Find each of the following and state the domain of each

a) f(g(x))

$f(\sqrt{x}) = x^2 - 1$

$= (\sqrt{x})^2 - 1$

$= x - 1$

$D: [0,\infty)$

b) g(f(x))

$g(x^2-1) = \sqrt{x}$

$= \sqrt{x^2-1}$

$x^2 - 1 \geq 0$

$x^2 \geq 1$

$x \leq -1$ or $x \geq 1$

$D: [1,\infty)$