Express $f+g$ as a Relation

$f = \{(0,1), (1,2), (2,-1), (3,4)\}$

$g = \{(-1,1), (1,1), (2,0), (3,5)\}$

① Domain $(f+g)$ = Domain(f) $\cap$ Domain(g)

Get x values for f and g that are in common

$= \{0,1,2,3\} \cap \{-1,1,2,3\}$

$= \{1,2,3\}$

② Get output of each element in domain.

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

$\downarrow$

$2 + 1$

3

$(1,3)$ belongs to $f+g$

$f(1) = 2$ since a y-value of 2 is associated with an x-value of 1 in relation f.

$g(1) = 1$ since a y-value of 1 is associated with an x-value of 1 in relation g.

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

$= -1 + 0$

-1

$(2,-1)$ belongs to $f+g$

$(f+g)(3) = f(3) + g(3)$

$4 + 5$

9

$(3,9)$ belongs to $f+g$

Overall $f+g = \{(1,3), (2,-1), (3,9)\}$

$f+g$ is undef for other input values

$(f+g)(0)$ is undefined since 0 is in the domain of f but not g.

$f = \{(0,1), (1,2), (2,3), (3,4)\}$

$g = \{(-1,1), (0,2), (1,3), (2,4)\}$

Find $(f-g)(2)$

① Domain(f) $\cap$ Domain(g)

$\{0,1,2\}$

② $(f-g)(2)$

$f(2) = 3$ $\quad$ $g(2) = 4$

$\downarrow$

$(3-4)$

-1

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

$f = \{(0,1), (1,2), (2,-1), (3,4)\}$

$g = \{(-1,1), (1,1), (2,0), (3,5)\}$

Find f/g as a relation

① $[\text{Domain}(f) \cap \text{Domain}(g)] - [x\text{-value where } g(x) = 0]$

$\{0,1,2,3\} \cap \{-1,1,2,3\} - \{2\}$

$\{1,2,3\} - \{2\}$

$\{1,3\}$

② $\left(\frac{f}{g}\right)(1) = \frac{f(1)}{g(1)} = \frac{2}{1} = 2$ ② $(1,2)$ is in relation f/g

$\left(\frac{f}{g}\right)(3) = \frac{f(3)}{g(3)} = \frac{4}{5} = .8$ $(3,.8)$ is in relation f/g

$f/g = \{(1,2), (3,.8)\}$

$f = \{(0,1), (1,2), (2,-1), (3,4)\}$

$g = \{(-1,1), (1,1), (2,0), (3,5)\}$

Express $f \circ g$ as a relation

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

① Focus on the Domain of the input function. In this case $g(x)$

Domain for $g(x)$: $\{-1, 1, 2, 3\}$

② Use the domain values

$f(g(-1))$

$g(-1) = 1$

$f(1) = 2$

$(f \circ g)(-1) = 2$

$f(g(1))$

$g(1) = 1$

$f(1) = 2$

$(f \circ g)(1) = 2$

$f(g(2))$

$g(2) = 0$

$f(0) = 1$

$(f \circ g)(0) = 1$

$f(g(3))$

$g(3) = 5$

$f(5) =$ undef

3 is not in the domain of $f \circ g$

$f \circ g$

$\{(-1,2), (1,2), (2,1)\}$

$f = \{(0,-1), (1,1), (2,3), (3,3)\}$

$g = \{(-1,1), (1,2), (2,0), (3,4)\}$

Find $(f \circ g)(1)$

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

Domain of $g(x)$: $\{-1, 1, 2, 3\}$

$f(g(-1)) \rightarrow 1 \rightarrow f(1) = 1$

$f(g(1)) \rightarrow 2 \rightarrow f(2) = 3$

$f(g(2)) \rightarrow 0 \rightarrow f(0) = -1$

$f(g(3)) \rightarrow 4 \rightarrow f(4) = \text{undef}$

My valid x values make up my domain.

Domain of $f \circ g$

$\{-1, 1, 2\}$

$f = \{(0,1), (1,2), (2,3), (3,4)\}$

$g = \{(-1,1), (0,2), (1,3), (2,4)\}$

$(f/g)(2)$ $\quad f(2) = 3$ $\quad g(2) = 4$

$$\frac{f(2)}{g(2)} = \frac{3}{4} = .75$$

$$4\overline{)3.0} \quad .75$$
$$-2\,8$$
$$20$$

$f = \{(x, 2x+1 \mid x \in (-\infty, \infty)\}$

$g = \{(x, x-1 \mid x \in (-\infty, \infty)\}$

Express fg as a relation

① Domain(f) $\cap$ Domain(g)

$(-\infty, \infty) \cap (-\infty, \infty)$

$(-\infty, \infty)$

② $(fg)(x)$

$f = 2x+1$ $\quad$ $g = x-1$

$(2x+1)(x-1)$

$2x^2 - 2x + x - 1$

$2x^2 - x - 1$

$fg = \{(x, 2x^2 - x + 1 \mid x \in (-\infty, \infty)\}$