Function Operations

Use the pair of functions $f(x) = \frac{x}{2}$ and $g(x) = \frac{2}{x}$ to find and simplify an expression for the indicated function. Express each answer as one simplified fraction. Then determine the domain in interval notation.

Evaluate $(f+g)(x)$	$(f+g)(x) =$; $(f+g)(x) = \frac{x^2+4}{2x}$	Domain in interval notation: $(-\infty,0)\cup(0,\infty)$

$$f(x)+g(x) = \frac{x}{2}+\frac{2}{x} = \frac{x}{2}\cdot\frac{x}{x}+\frac{2}{x}\cdot\frac{2}{2} = \frac{x^2}{2x}+\frac{4}{2x} = \frac{x^2+4}{2x}$$

no division by 0 , so exclude 0 any other value of x is allowed.

Evaluate $(f-g)(x)$	$(f-g)(x) =$; $(f-g)(x) = \frac{x^2-4}{2x}$	Domain in interval notation: $(-\infty,0)\cup(0,\infty)$

$$(f-g)(x) = f(x)-g(x) = \frac{x}{2}-\frac{2}{x} = \frac{x}{2}\cdot\frac{x}{x}-\frac{2}{x}\cdot\frac{2}{2} = \frac{x^2}{2x}-\frac{4}{2x} = \frac{x^2-4}{2x}$$

exclude 0 since that would lead to division by 0.

Evaluate $(f\cdot g)(x)$	$(f\cdot g)(x) =$; $(f\cdot g)(x) = 1$	Domain in interval notation: $(-\infty,0)\cup(0,\infty)$

$f(x)g(x) = (f\cdot g)(x) = \frac{x}{2}\cdot\frac{2}{x} = 1$ This is valid as long as $x \neq 0$, so exclude 0.

When x=0, we have $\frac{0}{2}\cdot\frac{2}{0} = 0\cdot\frac{2}{0}$ which is not defined since 0 is in the bottom. So exclude 0 from domain.

Evaluate $\left(\frac{f}{g}\right)(x)$	$\left(\frac{f}{g}\right)(x) =$; $\left(\frac{f}{g}\right)(x) = \frac{x^2}{4}$	Domain in interval notation: $(-\infty,0)\cup(0,\infty)$

$$\frac{f(x)}{g(x)} = \left(\frac{f}{g}\right)(x) = \frac{\frac{x}{2}}{\frac{2}{x}} = \text{keep change flip} = \frac{x}{2}\cdot\frac{x}{2} = \frac{x^2}{4}$$

exclude 0 b/c it doesn't work

in the unsimplified expression we get $\frac{\frac{0}{2}}{\frac{2}{0}}$ This is not valid because there is 0 in the denominator of 2/0.

A store has a 30 % sale on all items (x). For customers with a discount card, the store takes off an additional 30 % at the cash register. Write a price function S(x) that computes the final price of the item in terms of the original price x. (Hint: Use function composition to find your answer. The function is in terms of amount paid NOT amount of discount.)

$(S)(x) =$; $0.49x$

Question Help: Video

$(S)(x) = S(x)$

30% off means take 70% of the original price to get $0.7x$. At the cashier, 30% off again means take 70% of the $0.7x$ from above. So we get $S(x) = 0.7(0.7x) = 0.7\cdot 0.7x = 0.49x$

Prev Next 1 checked 0 remaining

☑ Mark Question for Use

Let $f(x) = \sqrt{-28 - x}$ and $g(x) = x^2 - 11x$.

$f \circ g$ = $\sqrt{-28 - x^2 + 11x}$

The domain of $f \circ g$ is: [4,7]

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

$= \sqrt{-28 - [x^2 - 11x]}$

$= \sqrt{-28 - x^2 + 11x}$

$= \sqrt{-x^2 + 11x - 28}$

domain must be such that

$-x^2 + 11x - 28 \geq 0$

divide by -1:

$x^2 - 11x + 28 \leq 0$ (flip all signs)

$(x-7)(x-4) \leq 0$ factor

set factors to 0 and check where the inequality is mad true.

Left of 4, use x=0:

$-0^2 + 11 \cdot 0 - 28 \geq 0$

$-28 \geq 0$ is false

Between 4 and 7 use x=5:

$-5^2 + 11(5) - 28 \geq 0$

$-25 + 55 - 28 \geq 0$

$2 \geq 0$ is true

Right of x=7, use $x = 8$:

$-8^2 + 11 \cdot 8 - 28 \geq 0$

$-64 + 88 - 28 \geq 0$

$-64 - 28 + 88 \geq 0$

$-92 + 88 \geq 0$

$-4 \geq 0$ is false

-<------ 4 ---------------7----- >

False *True* *False*

So the appropriate interval is $[4, 7]$ in interval notation.