Combining Functions

$f+g$ $f \cdot g$ $f-g$ fg $\frac{f}{g}$

$f(x) = \frac{x-4}{x+2}$ $x \neq -2$ $\quad g(x) = \frac{5x}{x-4}$ $x \neq 4$

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

$$= \frac{x^2-4x-4x+16+5x^2+10x}{(x+2)(x-4)} = \frac{2(3x^2+x+8)}{6x^2+2x+16}$$

$(x+2)(x-4)$

$x \neq -2, 4$

Must check the domains of the original functions and the new func.

$f(x) = \frac{x-4}{x+2}$ $x \neq -2$ $\quad g(x) = \frac{x-4}{5x}$ $x \neq 0$

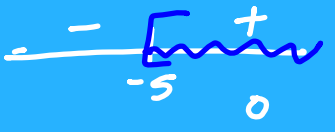
$$\frac{f}{g} = \frac{\frac{x-4}{x+2}}{\frac{x-4}{5x}} = \frac{x-4}{x+2} \cdot \frac{5x}{x-4} = \frac{5x}{x+2}$$ $x \neq -2, 0$

$$\frac{5x^2}{x^2-4x+3} \cdot \frac{x^2-9}{20x}$$

$$= \frac{5x^2}{(x-3)(x-1)} \cdot \frac{(x-3)(x+3)}{20x} = \frac{x(x+3)}{4(x-1)}$$ $x \neq 0, 1, 3$

$x \neq 1, 3$ $\quad x \neq 0$

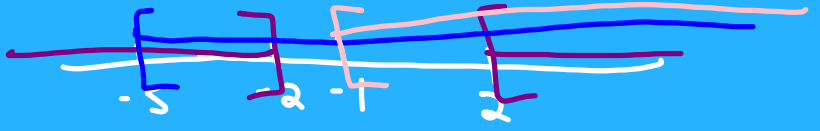
$p(x) = \sqrt{x^2 - 4}$ $_{(x+2)(x-2)}$ $q(x) = \sqrt{x+5}$



$(p \circ q)(x) = \sqrt{(\sqrt{x+5})^2 - 4}$

$= \sqrt{x+5-4}$

$= \sqrt{x+1}$



$[2, \infty)$

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Book problems

$(f \circ g)(x) = (x^2 + 2x - 4)^5$

$f(x) = (x-4)^5 \qquad g(x) = x^2 + 2x$

$f(x) = x^5 \qquad g(x) = x^2 + 2x - 4$