Combining Functions + Domain

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

$(f+g)(x) = \frac{(x+3)}{(x+3)}\frac{x-4}{1} + \frac{5x}{x+3}$

$= \frac{x^2 - x - 12 + 5x}{x+3}$

$= \frac{x^2 + 4x - 12}{x+3}$

f: $\mathbb{R}$

g: $x \neq -3$

$f+g$: $x \neq -3$

$\boxed{x \neq -3}$

* Must check domains of the original func. as well as the new function!

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

$\mathbb{R}$ $x \neq -3$

$\left(\frac{f}{g}\right)(x) = \frac{x-4}{\frac{5x}{x+3}}$

$= \frac{x-4}{1} \cdot \frac{x+3}{5x}$

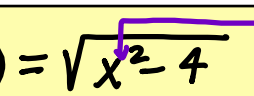
$= \frac{x^2 - x - 12}{5x}$ $x \neq 0$

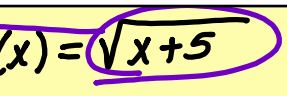
Overall:

$\frac{f}{g} = \frac{x^2 - x - 12}{f(x)}$

$x \neq -3, 0$

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



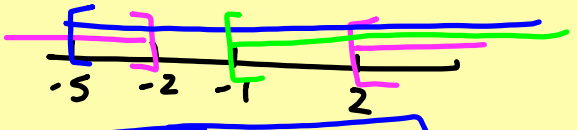


Find $(p \circ q)(x)$

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

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

$= \sqrt{x+1}$



Overall: $[a, \infty)$

$j(x) = \sqrt{9 - x^2}$ $\quad t(x) = \sqrt{4 - x}$

Find $(j \circ t)(x)$

$j \circ t = \sqrt{9 - (\sqrt{4-x})^2}$

$= \sqrt{9 - (4 + x)}$

$= \sqrt{5 + x}$

j: − [+] − (−3, 3)

t: [+) − (0, 4)

$j \circ t$: − [+) (−5, 0)

−5 −3 3 4

Overall: $[-3, 3]$

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

$f = x^5$ $\quad (x-4)^5$

$g = x^2+2x-4$ $\quad x^2+2x$

A star explodes + moves in all directions forming a sphere: Expands 10,000 ft/sec

Find a function for Volume in terms of time.

$V = \frac{4}{3}\pi r^3$ $\quad r = 10{,}000t$

$V = \frac{4}{3}\pi (10{,}000t)^3$

$V = \frac{4{,}000{,}000{,}000{,}000}{3} t^3$

$V(s) = \frac{500{,}000{,}000{,}000{,}000}{3}\ ft^3$