

COMPOSITION OF FUNCTIONS

$$f(x) = \frac{2}{x-1} \quad x \neq 1$$

$$g(x) = \frac{3x}{x+2} \quad x \neq -2$$

Domain

- 1) f
- 2) g
- 3) f ∘ g

$$(f \circ g)(x) = \frac{2}{\frac{3x}{x+2} - 1} = \frac{2}{\frac{3x}{x+2} + \frac{-x-2}{x+2}} = \frac{2}{\frac{2x-2}{x+2}}$$

$$= \frac{2}{1} \cdot \frac{x+2}{2x-2} = \frac{x+2}{x-1} \quad \text{Domain } x \neq -2, 1$$

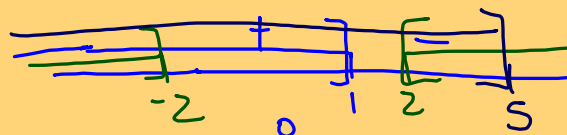
$$(g \circ f)(x) = \frac{3}{\frac{2}{x-1}} = \frac{3}{\frac{2}{x-1} + \frac{2(x-1)}{1(x-1)}} = \frac{3}{\frac{2+2x-2}{x-1}} = \frac{3}{\frac{2x}{x-1}} = \frac{3}{1} \cdot \frac{x-1}{2x} = \frac{3(x-1)}{2x}$$

Domain: $x \neq 1, -2, 0$

$$f(x) = \sqrt{x^2 - 4} \quad g(x) = \sqrt{5 - x}$$

$(x-2)(x+2)$
 $\begin{array}{c} +] - [+ \\ -2 \quad 2 \end{array}$
 $\begin{array}{c} +] - \\ 0 \quad 5 \end{array}$

$$(f \circ g)(x) = \sqrt{(\sqrt{5-x})^2 - 4} = \sqrt{5-x-4} = \sqrt{1-x}$$



Domain: $(-\infty, -2]$

Given $(f \circ g)(x) = h(x)$ and $h(x) = \sqrt{x+4} + 3$
 determine possible functions for f and g .

$$h(x) = \sqrt{x+4} + 3$$

$$f(x) = \sqrt{x} + 3 \quad g(x) = \textcircled{x+4}$$

$$f(x) = x + 3 \quad g(x) = \sqrt{x+4}$$

$$h(x) = 4(x+7)^2 + 2(x+7) - 8$$

$$f(x) = 4x^2 + 2x - 8 \quad g(x) = x + 7$$

Buying a Car - Two money-saving opportunities.

\$1200 Rebate and 8% discount.

$x = \text{cost of car}$

$$R(x) = x - 1200$$

$$D(x) = 0.92x$$

$$x - 0.08x$$

$$(R \circ D)(x) = 0.92x - 1200$$

$$(D \circ R)(x) = 0.92(x - 1200)$$

$$\text{Price} = 18,400$$

$$(R \circ D)(18,400) = 0.92(18,400) - 1200 = \$15,728$$

$$(D \circ R)(18,400) = 0.92(18,400 - 1200) = \$15,824$$