

-OR GIVEN FUNCTIONS FIND  $(f \circ g)(4)$   $(g \circ f)(2)$

$$f(x) = 2x^2 \quad g(x) = 1 - 3x^2$$

$$(f \circ g)(4) = f(g(4)) = f(1 - 3 \cdot 4^2) = f(-47) = 2(-47)^2 = 4418$$

$$(g \circ f)(2) = g(f(2)) = g(2 \cdot 2^2) = g(8) = 1 - 3 \cdot 8^2 = 1 - 192 = -191$$

FIND THE DOMAIN OF  $f \circ g$  FOR GIVEN FUNCTIONS

$$f(x) = \sqrt{x} \quad g(x) = 2x - 3$$

$$(f \circ g)(x) = f(2x - 3) = \sqrt{2x - 3}$$

$$\left. \begin{array}{l} \text{domain } g(x) \quad (-\infty, \infty) \\ \text{domain } \sqrt{2x-3} \\ 2x-3 \geq 0 \\ x \geq \frac{3}{2} \end{array} \right\} (-\infty, \infty) \cap \left[\frac{3}{2}, \infty\right) = \left[\frac{3}{2}, \infty\right)$$

FIND THE DOMAIN FOR  $f \circ g$  AND  $g \circ f$  FOR GIVEN FUNCTIONS

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

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

$$-\infty \quad \text{---} \quad -\frac{2}{3} \quad \text{---} \quad 0 \quad \text{---} \quad \infty$$

$$\text{Domain } g(x) : (-\infty, 0) \cup (0, \infty)$$

$$\text{Domain } \frac{2}{2+3x} : (-\infty, -\frac{2}{3}) \cup (-\frac{2}{3}, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$$

$$= \text{Domain } f \circ g$$

$$(-\infty, -\frac{2}{3}) \cup (-\frac{2}{3}, 0) \cup (0, \infty)$$

$$(g \circ f)(x) = \frac{2}{\frac{x}{x+3}} = 2 \cdot \frac{x+3}{x} = \frac{2x+6}{x}$$

$$\text{Domain } f(x) : (-\infty, -3) \cup (-3, \infty)$$

$$\text{Domain } \frac{2x+6}{x} : (-\infty, 0) \cup (0, \infty)$$

$$\text{Domain } f \circ g$$

$$(-\infty, -3) \cup (-3, 0) \cup (0, \infty)$$