

4.1

31) a)  $f \circ g$

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

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

$$f(g(x)) = 2(g(x)) + 3$$

$$= 2(3x) + 3$$

$$= 6x + 3$$

$$D: (-\infty, \infty)$$

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

$$g(2x+3) = 3(2x+3)$$

$$= 6x + 9$$

$$D: (-\infty, \infty)$$

$$f(x) = \sqrt{x} ; g(x) = 2x + 3$$

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

$$f(g(x)) = \sqrt{g(x)}$$

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

$$\begin{array}{r} 2x + 3 \geq 0 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\begin{array}{r} 2x \geq -3 \\ \frac{2x}{2} \geq \frac{-3}{2} \\ \hline \end{array}$$

$$\{x \mid x \geq -3/2\}$$

$$x \geq -3/2$$

$$(45) f(x) = \frac{x-5}{x+1}, g(x) = \frac{x+2}{x-3}$$

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

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

$$= \frac{\left(\frac{x-5}{x+1}\right) - 5}{\left(\frac{x-5}{x+1}\right) + 1}$$

smaller tasks

task

2

$$\frac{x-5}{x+1} + \frac{1}{1} \cdot \frac{x+1}{x+1}$$

$$\frac{x-5}{x+1} + \frac{x+1}{x+1}$$

$$\frac{x-5+x+1}{x+1}$$

$$\frac{2x-4}{x+1}$$

denominator

task 1

$$\frac{x-5}{x+1} - \frac{5}{1} \cdot \frac{x+1}{x+1}$$

$$\frac{x-5-5(x+1)}{x+1}$$

$$\frac{x-5-5x-5}{x+1}$$

$$\frac{-4x-10}{x+1}$$

numerator

$$= \frac{\frac{-4x-10}{x+1} \quad \text{numerator}}{\frac{2x-4}{x+1} \quad \text{denominator}}$$

$$= \frac{-4x-10}{\cancel{x+1}} \cdot \frac{\cancel{x+1}}{2x-4} \quad \text{cross reduce}$$

$$(f \circ f)(x) = \frac{-4x-10}{2x-4}$$

Domain

$$2x - 4 \neq 0$$

$$\begin{array}{r} +4 \quad +4 \\ \hline \end{array}$$

$$\{x \mid x \neq 2\}$$

$$\frac{2x \neq 4}{2} \quad \frac{4}{2}$$

$$x \neq 2$$