

$$37. f(x) = \frac{x}{x+1}, \quad g(x) = 2x - 1$$

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

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

$g(x)$

$$D: -\infty < x < \infty$$

$$-\infty < 2x < \infty$$

$$R: -\infty < 2x - 1 < \infty$$

$$x < -1 \quad \text{or} \quad \underline{-1 < x}$$

$$-\infty < x+1 < 0$$

$$0 < x+1 < \infty$$

$$0 > \frac{1}{x+1} > -\infty$$

$$\infty > \frac{1}{x+1} > 0$$

$$0 < -\frac{1}{x+1}$$

$$-\frac{1}{x+1} < 0$$

$$1 < 1 - \frac{1}{x+1} = \frac{x}{x+1}$$

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

$$1 < \frac{x}{x+1}$$

$$\text{Range: } 1 < \frac{x}{x+1} \quad \text{or} \quad \frac{x}{x+1} < 1$$

f

D: $x \neq -1$

R: $y \neq 1$

g

all real

all real

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

$$\rightarrow 2x-1 \neq -1$$

$$2x \neq 0$$

$$x \neq 0$$

$$x < 0 \quad \text{or} \quad x > 0$$

D: $x \neq 0$

$$-\infty < 2x < 0$$

$$\infty > 2x > 0$$

$$0 > \frac{1}{2x} > -\infty$$

$$0 < \frac{1}{2x} < \infty$$


R: $y \neq 1$

$$0 < -\frac{1}{2x}$$

$$0 > \frac{1}{2x}$$

$$1 > 1 - \frac{1}{2x}$$

$$1 < 1 - \frac{1}{2x} \quad \text{or}$$

	f		g
D:	$x \neq -1$		all real
R:	$y \neq 1$		all real

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

$$D: x \neq -1 \qquad = 1 - \frac{2}{x+1}$$

$x < -1$	or	$x > -1$
$-\infty < x+1 < 0$		$x+1 > 0$

$$0 > \frac{1}{x+1} > -\infty$$

$$\frac{1}{x+1} > 0$$

$$0 < -\frac{2}{x+1}$$

$$-\frac{2}{x+1} < 0$$

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

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

$$R: y \neq 1$$