Find $f \circ g$ and $g \circ f$, their domains, and evaluate the composition for the given values.

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

$$f(x) = 2x - 3;\ g(x) = x + 1\ ;(f \circ g)(3)\ and\ (g \circ f)(-2).$$

$(f \circ g)(x) = f(g(x)) = 2(x+1) - 3 = 2x + 2 - 3 = 2x - 1$ D: $(-\infty, \infty)$

$(g \circ f)(x) = g(f(x)) = (2x - 3) + 1 = 2x - 3 + 1 = 2x - 2$ D: $(-\infty, \infty)$

$(f \circ g)(3) = f(g(3)) = 2(3) - 1 = 6 - 1 = 5$

$(g \circ f)(-2) = 2(-2) - 2 = -4 - 2 = -6$

Find *f* o *g* and *g* o *f*, their domains, and evaluate the composition for the given values.

D: $(-\infty,\infty)$ D: $[-1,\infty)$

$$f(x)=x^2+4;\ g(x)=\sqrt{x+1}\ ;(f\circ g)(-3)\ and\ (g\circ f)(2).$$

$(f\circ g)(x)=\left(\sqrt{x+1}\right)^2+4=x+1+4=x+5$ D: $[-1,\infty)$

$(g\circ f)(x)=\sqrt{(x^2+4)+1}=\sqrt{x^2+5}$ D: $[-1,\infty)$

$(f\circ g)(-3)=f(g(-3))\Rightarrow$ NOT POSSIBLE (-3 IS NOT IN THE DOMAIN...)

$(g\circ f)(2)=\sqrt{2^2+5}=\sqrt{9}=3$

Find $f \circ g$ and $g \circ f$, their domains, and evaluate the composition for the given values.

D: $(-\infty,\infty)$ D: $(-\infty,1)\cup(1,\infty)$

$$f(x)=x^2-1;\ g(x)=\frac{1}{x-1}\ ;(f\circ g)(-1)\ and\ (g\circ f)(4).$$

$(f\circ g)(x)=f(g(x))=\left(\frac{1}{x-1}\right)^2-1=\frac{1}{(x-1)^2}-1$ D: $(-\infty,1)\cup(1,\infty)$

$(g\circ f)(x)=g(f(x))=\frac{1}{(x^2-1)-1}=\frac{1}{x^2-2}$ D: $(-\infty,-\sqrt{2})\cup(-\sqrt{2},1)\cup(1,\sqrt{2})\cup(\sqrt{2},\infty)$

$(f\circ g)(-1)=f(g(-1))=\frac{1}{(-1-1)^2}-1=\frac{1}{(-2)^2}-1=\frac{1}{4}-1=\frac{3}{4}$

$(g\circ f)(4)=g(f(4))=\frac{1}{4^2-2}=\frac{1}{16-2}=\frac{1}{14}$

Find $f \circ g$ and $g \circ f$, their domains, and evaluate the composition for the given values.

$x \neq 0$ $\qquad$ $x \neq 0$

$$f(x)=\frac{1}{2x};\ g(x)=\frac{1}{3x}\ ;(f \circ g)(0)\,and\,(g \circ f)\left(-\frac{2}{3}\right).$$

$$(f \circ g)(x) = f(g(x)) = \frac{1}{2\left(\frac{1}{3x}\right)} = \frac{1}{\frac{2}{3x}} = \frac{3x}{2} \qquad D: (-\infty, 0) \cup (0, \infty)$$

$$(g \circ f)(x) = g(f(x)) = \frac{1}{3\left(\frac{1}{2x}\right)} = \frac{1}{\frac{3}{2x}} = \frac{2x}{3} \qquad D: (-\infty, 0) \cup (0, \infty)$$

$f(g(0))$ IS NOT POSSIBLE: $x \neq 0$ for $g(x)$

$$g(f(-2/3)) = \frac{2\left(\frac{-2}{3}\right)}{3} = \frac{\frac{-4}{3}}{3} = \frac{-4}{3} \cdot \frac{1}{3} = \frac{-4}{9}$$

Find $f \circ g$ and $g \circ f$, their domains, and evaluate the composition for the given values.

$$f(x)=x^3;\ g(x)=\sqrt[3]{1-x^3}\ ;(f\circ g)(0)\,and\,(g\circ f)(1).$$

$f(g(x))=\left(\sqrt[3]{1-x^3}\right)^3=1-x^3$ D: $(-\infty,\infty)$

$g(f(x))=\sqrt[3]{1-(x^3)^3}=\sqrt[3]{1-x^9}$ D: $(-\infty,\infty)$

$f(g(0))=1-0^3=1$

$g(f(1))=\sqrt[3]{1-1^9}=\sqrt[3]{1-1}=\sqrt[3]{0}=0$

A commercial bakery makes a mango meltaway cookie. The cost to make the cookie depends on the diameter of the mango pit. The size of the mango pit depends on the average temperature during the growing season.

The cost to manufacture the cookie is $c = f(m)$

m Size of Mango Pit in millimeters	20	30	40	50	60	70
c Cookie Cost per cookie in dollars	.005	.008	.012	0.17	.023	.030

$= f(m)$

$f(40) = 0.12$

The size of the pit is a function of temperature $m = g(t)$

t Temperature in °F	80°	85°	90°	95°	100°	105°
m Size of Mango Pit in millimeters	18	24	32	40	50	62

$= g(t)$

$g(95) = 40$

Use the tables to evaluate $f(g(95^0))$

The size of a baby tarantula depends upon the number of eggs laid by the mother. $s = f(n)$
The number of eggs laid by the mother depends upon the age of the mother. $n = g(a)$

n number of eggs	100	120	140	160	180	200	
s size of tarantula (in.)	10	9	8	7	.6	5	$= f(n)$

$f(120) = 9$

a Age in years	4	8	12	16	20	24	
n number of eggs	100	120	140	160	180	200	$= g(a)$

Use the tables to evaluate $f(g(8))$. $g(8) = 120$

The number of cherry tomatoes produced by a single pland depends upon the amount of acid found in the soil. $t = f(a)$

The size of the pit is a function of temperature. $a = g(z)$ $f(15)=200$

a % acid	10	15	20	25	30	35
t number of tomatoes	240	200	160	120	80	40

$= f(a)$

z zone	1	2	3	4	5	6
a acid	35	30	25	20	15	10

$= g(z)$

$g(5)=15$

Use the tables to evaluate $f(g(5))$.

Find $f(x)$ and $g(x)$ so that $h(x) = f(g(x))$. (There may be more than one answer.) DECOMPOSE

$$h(x) = \sqrt{x - 7}$$

$g(x) =$ $x - 7$

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

Find $f(x)$ and $g(x)$ so that $h(x) = f(g(x))$. (There may be more than one answer.) DECOMPOSE

$$h(x) = \left(x^3 - 3\right)^2$$

$g(x) =$ $x^3 - 3$ or x^3

$f(x) =$ x^2 $(x-3)^2$

Find $f(x)$ and $g(x)$ so that $h(x) = f(g(x))$. (There may be more than one answer.) DECOMPOSE

$$h(x) = \frac{2}{\sqrt{3x+5}}$$

$g(x) =$ $3x+5$ OR $\sqrt{3x+5}$ OR $3x$

$f(x) =$ $\frac{2}{\sqrt{x}}$ $\frac{2}{x}$ $\frac{2}{\sqrt{x+5}}$

Find $f(x)$ and $g(x)$ so that $h(x) = f(g(x))$. (There may be more than one answer.) DECOMPOSE

$$h(x) = \left|\left(\sqrt{x} - 3\right)^2\right|$$

$g(x) = \sqrt{x-3}$ or $\sqrt{x}$ or $(\sqrt{x}-3)^2$

$f(x) = |x^2|$ $|(x-3)^2|$ $|x|$

Find $g(f(x))$ and $f(g(x))$ for $f(x)=\frac{3}{4x}$ *and* $g(x)=\frac{x}{2x}$

$$g(f(x))=\frac{\cancel{\frac{3}{4x}}\;1}{2\left(\cancel{\frac{3}{4x}}\right)\;1}=\frac{1}{2}$$

$$f(g(x))=\frac{3}{4\left(\frac{\cancel{x}^{1}}{2\cancel{x}_{1}}\right)}=\frac{3}{4\left(\frac{1}{2}\right)}=\frac{3}{2}$$

$g(f(x))=$ $\frac{1}{2}$ ______________

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