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#5, 12, 14, 15-22, 37, 40

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

$f/g = \frac{\sqrt{x+3}}{x^2}$ $[-3, 0) \cup (0, \infty)$

$g/f = \frac{x^2}{\sqrt{x+3}}$ $(-3, \infty)$

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

$(f \circ g)(3) = 8$
$(g \circ f)(-2) = 3$

(14) $f(x) = \frac{x}{x+1}$
$g(x) = 9 - x^2$

$(f \circ g)(3) = 0$
$(g \circ f)(-2) = 5$

(15) $f(x) = 3x + 2$
$g(x) = x - 1$

$f(g(x)) = 3x - 1$ $(-\infty, \infty)$
$g(f(x)) = 3x + 1$ $(-\infty, \infty)$

(16) $f(x) = x^2 - 1$
$g(x) = \frac{1}{x-1}$

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

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

(17) $f(x) = x^2 - 2$
$g(x) = \sqrt{x+1}$

$f(g(x)) = x - 1$
D: $[-1, \infty)$

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

(18) $f(x) = \frac{1}{x-1}$ $\quad f(g(x)) = \frac{1}{\sqrt{x}-1}$ $\quad x+1 \; x \geq 0$

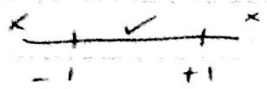
$g(x) = \sqrt{x}$ $\quad D: [0,1) \cup (1,\infty)$

$g(f(x)) = \sqrt{\frac{1}{x-1}} = \frac{1}{\sqrt{x-1}}$

$D: (1,\infty)$

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

$g(x) = \sqrt{1-x^2}$ $\quad D: [-1,1]$



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

$D: [-1,1]$

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

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

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

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

(21) $f(x) = \frac{1}{2x}$ $\quad f(g(x)) = \frac{1}{2(\frac{1}{3x})} = \frac{3x}{2}$

$g(x) = \frac{1}{3x}$ $\quad D: (-\infty,0) \cup (0,\infty)$

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

$D: (-\infty,0) \cup (0,\infty)$

(22) $f(x) = \frac{1}{x+1}$ $\quad f(g(x)) = \frac{1}{\frac{1}{x-1}+1} = \frac{1}{\frac{1}{x-1}+\frac{x-1}{x-1}} = \frac{1}{\frac{x}{x-1}}$

$g(x) = \frac{1}{x-1}$ $\quad = \frac{x-1}{x}$ $\quad (-\infty,0) \cup (0,1) \cup (1,\infty)$

$g(f(x)) = -\frac{x+1}{x}$ $\quad (-\infty,-1) \cup (-1,0) \cup (0,\infty)$

(37) $x^2 + y^2 = 25$

$y^2 = -x^2 + 25$

$y = \sqrt{25 - x^2}$ $\qquad$ $y = -\sqrt{25 - x^2}$

(40) $3x^2 - y^2 = 25$

$3x^2 - 25 = y^2$

$y = \sqrt{3x^2 - 25}$ $\qquad$ $y = -\sqrt{3x^2 - 25}$