

Pg 145

1. 33
5. dne $f(-\frac{1}{2}) = -2\frac{2}{3}$ 3. -1
 $f(-\frac{1}{2}) = 0$ 7. 0

18b. $g(-\frac{1}{2}) = 0$

$(f+g)(x) = 3x-1$
 $(f-g)(x) = 5x+3$
 $(f \cdot g)(x) = -4x^2 + 6x - 2$
 $(f \cdot f)(x) = x^2 - 2x + 1$

$(f/g)(x) = \frac{-x+1}{4x-2} \rightarrow D: \{x | x \neq \frac{1}{2}\}$
 $(g/f)(x) = \frac{4x-2}{-x+1} \rightarrow D: \{x | x \neq 1\}$

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

21b.
 $(f+g)(x) = -2x^2 + 2x - 1$
 $(f-g)(x) = 2x^2 + 2x - 1$
 $(f \cdot g)(x) = -4x^3 + 2x^2$
 $(f \cdot f)(x) = 4x^2 - 4x + 1$

$(f/g)(x) = \frac{2x-1}{-2x^2} \rightarrow D: \{x | x \neq 0\}$
 $(g/f)(x) = \frac{-2x^2}{2x-1} \rightarrow D: \{x | x \neq \frac{1}{2}\}$

$g(f(-2)) = 3(-2) + 1 = -5$
 $f(-2) = 3(-2) + 1 = -5$
 $g(-5) = 3(-5) + 1 = -14$

65. $(f \circ g)(x) = x \rightarrow D: \{x | x \in \mathbb{R}\}$
 $(g \circ f)(x) = x \rightarrow D: \{x | x \in \mathbb{R}\}$

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More Composition of Functions

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Warm-Up: Simplify and state restrictions.

1. $\frac{1}{x} + \frac{x+1}{x} = \frac{1+x(x+1)}{x} = \frac{1+x^2+x}{x}$
 $x \neq 0$

2. $\frac{1}{x+1} + \frac{x+1}{x+1} = \frac{1+x(x+1)}{x+1} = \frac{1+x^2+x}{x+1}$
 $x \neq -1$

3. $\frac{x+1}{x} : \frac{x+1}{x} = \frac{x+1}{x} \cdot \frac{x}{x} = \frac{x(x+1)}{x}$
 $x \neq 0$

4. $\frac{1}{x+1} : \frac{x}{x} = \frac{1}{x(x+1)}$
 $x \neq 0, -1$

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For each of the following, state domain restrictions if they exist and find the indicated compositions.

1. $f(x) = \frac{1}{x}$ and $g(x) = x+1$

a. $(f+g)(x) = f(x) + g(x) = \frac{1}{x} + x+1$
 $WU \#1: \frac{1}{x} + x+1$

b. $(f-g)(x) = f(x) - g(x) = \frac{1}{x} - x-1$
 $WU \#1: \frac{1}{x} - x-1$

c. $(f \cdot g)(x) = f(x) \cdot g(x) = \frac{1}{x} \cdot (x+1) = \frac{x+1}{x}$
 $WU \#4: \frac{x+1}{x}, x \neq 0$

d. $(\frac{f}{g})(x) = \frac{f(x)}{g(x)} = \frac{1}{x(x+1)}$
 $WU \#4: \frac{1}{x(x+1)}, x \neq 0, -1$

e. $(f \circ g)(x) = f(g(x)) = \frac{1}{x+1}$
 $WU \#4: \frac{1}{x+1}, x \neq -1$

f. $(g \circ f)(x) = g(f(x)) = \frac{1}{x} + 1 = \frac{1+x}{x}$
 $WU \#4: \frac{1+x}{x}, x \neq 0$

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

a. $(f+g)(x) =$

b. $(g-f)(x) =$

c. $(f \cdot g)(x) =$

d. $(\frac{g}{f})(x) =$

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

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

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3. $f(x) = \frac{2x+1}{x^2}$ and $g(x) = 3x-2$

a. $(f+g)(x) = f(x) + g(x) = \frac{2x+1}{x^2} + 3x-2$
 $WU \#1: \frac{2x+1}{x^2} + 3x-2$

b. $(g-f)(x) = g(x) - f(x) = 3x-2 - \frac{2x+1}{x^2}$
 $WU \#1: 3x-2 - \frac{2x+1}{x^2}$

c. $(f \cdot g)(x) = f(x) \cdot g(x) = \frac{2x+1}{x^2} \cdot (3x-2) = \frac{(2x+1)(3x-2)}{x^2}$
 $WU \#4: \frac{(2x+1)(3x-2)}{x^2}, x \neq 0$

d. $(\frac{g}{f})(x) = \frac{g(x)}{f(x)} = \frac{3x-2}{\frac{2x+1}{x^2}} = \frac{(3x-2)x^2}{2x+1}$
 $WU \#4: \frac{(3x-2)x^2}{2x+1}, x \neq -\frac{1}{2}, 0$

e. $(f \circ g)(x) = f(g(x)) = \frac{2(3x-2)+1}{(3x-2)^2} = \frac{6x-4+1}{(3x-2)^2} = \frac{6x-3}{(3x-2)^2}$
 $WU \#4: \frac{6x-3}{(3x-2)^2}, x \neq \frac{2}{3}, 0$

f. $(g \circ f)(x) = g(f(x)) = 3(\frac{2x+1}{x^2}) - 2 = \frac{6x+3}{x^2} - 2 = \frac{6x+3-2x^2}{x^2}$
 $WU \#4: \frac{6x+3-2x^2}{x^2}, x \neq 0$

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4. If $f(x) = x^3$ find $f(x - 2)$

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