Pg 145

1. 33
3. -1
5. ~~dne~~ Undefined
7. 0

18b.

$(f + g)(x) = 3x - 1$
$(f - g)(x) = 5x - 3$
$(f \cdot g)(x) = -4x^2 + 6x - 2$
$(f \cdot f)(x) = x^2 - 2x + 1$
$(f/g)(x) = \frac{-x+1}{4x-2} \rightarrow D: \left\{x \mid x \neq \frac{1}{2}\right\}$
$(g/f)(x) = \frac{4x-2}{-x+1} \rightarrow D: \{x \mid x \neq 1\}$

21b.

$(f + g)(x) = -2x^2 + 2x - 1$
$(f - g)(x) = 2x^2 + 2x - 1$
$(f \cdot g)(x) = -4x^3 + 2x^2$
$(f \cdot f)(x) = 4x^2 - 4x + 1$
$(f/g)(x) = \frac{2x-1}{-2x^2} \rightarrow D: \{x \mid x \neq 0\}$
$(g/f)(x) = \frac{-2x^2}{2x-1} \rightarrow D: \left\{x \mid x \neq \frac{1}{2}\right\}$

54. $(g \circ f)(-2) = 29$

65. $(f \circ g)(x) = x \rightarrow D: \{x \mid x \in \Re\}$
$(g \circ f)(x) = x \rightarrow D: \{x \mid x \in \Re\}$

Aug 22-9:22 AM

65) $f(x) = 3x - 7$, $g(x) = \frac{x+7}{3}$

$(f \circ g)x = f(g(x)) = f\left(\frac{x+7}{3}\right) = \frac{3}{1}\left(\frac{x+7}{3}\right) - 7$

$= x + 7 - 7 = x$ ✓

$(g \circ f)x = g(3x-7) = \frac{3x-7+7}{3} = \frac{3x}{3} = x$ ✓

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

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

$g(x) = 2x + 1$

$= (-1)^2 - 3 - (2(-1)+1)$

$= -2 + (+1) = -1$

5-1) $f(x) = 3x + 1$, $g(x) = x^2 - 2x - 6$

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

$= (-5)^2 - 2(-5) - 6$

$= 25 + 10 - 6$

$= 29$

Sep 21-9:13 AM

# More Composition of Functions

Aug 22-10:25 AM

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

b. $(f - g)(x) = \frac{1}{x} - \frac{(x+1)}{1}\frac{x}{x} = \frac{1-x^2-x}{x} = \frac{-x^2-x+1}{x}, x \neq 0$

c. $(f \bullet g)(x) = \frac{1}{x}\frac{(x+1)}{1} = \frac{x+1}{x}, x \neq 0$

d. $\left(\frac{f}{g}\right)(x) = \frac{\frac{1}{x}}{\frac{x+1}{1}} = \frac{1}{x} \cdot \frac{1}{x+1} = \frac{1}{x^2+x}$

$x(x+1) \neq 0$

$x \neq 0 \quad x \neq -1$

$x \neq 0, -1$

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

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

f. $(g \circ f)(x) = g(f(x)) = g\left(\frac{1}{x}\right)$

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

$= \frac{x+1}{x}; x \neq 0$

Aug 22-10:23 AM

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

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

$x - 3 \geq 0$

$x \geq 3$

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

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

$= x^2\sqrt{x-3} - \sqrt{x-3}$

$x \geq 3$

$\sqrt{a^2-b} \neq \sqrt{a^2} - \sqrt{b^2}$

d. $\left(\frac{g}{f}\right)(x) = \frac{x^2-1}{\sqrt{x-3}}, x > 3$

e. $(f \circ g)(x) = f(x^2-1)$

$= \sqrt{(x^2-1)-3} = \sqrt{x^2-4}$

Skip

$\sqrt{x^2-4} \neq x-2$

$(x-2)(x-2)$

$x^2 - 4x + 4$

f. $(g \circ f)(x) = g(\sqrt{x-3})$

$= (\sqrt{x-3})^2 - 1 = x - 3 - 1 = x - 4$

$x \geq 3$

Aug 22-10:23 AM

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

a. $(f + g)(x) = \frac{2x+1}{x^2} + \left(\frac{3x-2}{1}\right)\frac{x^2}{x^2} = \frac{2x+1+3x^3-2x^2}{x^2} = \frac{3x^3-2x^2+2x+1}{x^2}$, $x \neq 0$

b. $(g - f)(x) = \left(\frac{3x-2}{1}\right)\frac{x^2}{x^2} - \frac{2x+1}{x^2} = \frac{3x^3-2x^2-2x-1}{x^2}$; $x \neq 0$

c. $(f \bullet g)(x) = \left(\frac{2x+1}{x^2}\right)\left(\frac{3x-2}{1}\right) = \frac{6x^2-4x+3x-2}{x^2} = \frac{6x^2-x-2}{x^2}$, $x \neq 0$

d. $\left(\frac{g}{f}\right)(x) = \frac{(3x-2)x^2}{\left(\frac{2x+1}{x^2}\right)x^2} = \frac{3x^3-2x^2}{2x+1}$, $x \neq -\frac{1}{2}, 0$

e. $(f \circ g)(x) = f(3x-2) = \frac{2(3x-2)+1}{(3x-2)^2} = \frac{6x-4+1}{9x^2-12x+4} = \frac{6x-3}{9x^2-12x+4}$, $x \neq 2/3$

f. $(g \circ f)(x) = g\left(\frac{2x+1}{x^2}\right) = \frac{3}{1}\left(\frac{2x+1}{x^2}\right) - 2 = \frac{6x+3}{x^2} - \left(\frac{2}{1}\right)\frac{x^2}{x^2} = \frac{6x+3-2x^2}{x^2} = \frac{-2x^2+6x+3}{x^2}$, $x \neq 0$

Aug 22-10:23 AM

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

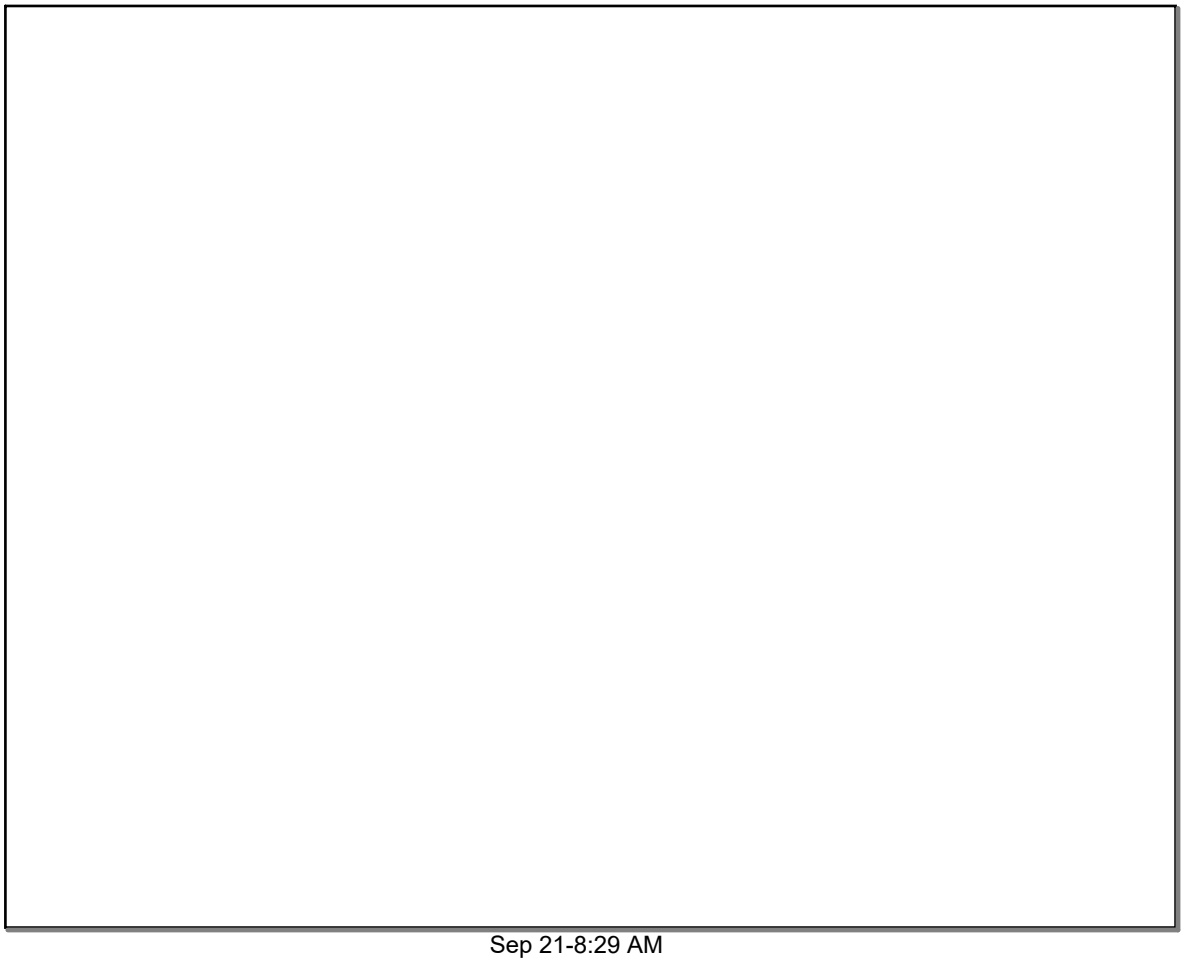
$= (x-2)^3 = (\quad)(\quad)(\quad)$

$= (x-2)(x^2-4x+4)$

$= x^3-4x^2+4x-2x^2+8x-8$

$= x^3-6x^2+12x-8$

Aug 22-10:23 AM



Sep 21-8:29 AM