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Find the indicated nth root(s) of a.

1. n = 3, a = 8

$x^3 = 8$

$x = 2$

2. N = 5, a = -1

$x^5 = -1$

$x = -1$

3. n = 4, a = 256

$x^4 = 256$

$x = \pm 4$

4. N = 6, a = -729

$x^6 = -729$

No Sol

Evaluate the expression without using a calculator.

5. $8^{1/3}$

2

6. $81^{3/4}$

$(81^{1/4})^3$

$(3)^3$

27

7. $(-64)^{4/3}$

$(-64^{1/3})^4$

$(-4)^4$

256

8. $16^{-7/4}$

$(\frac{1}{16}^{1/4})^7$

$(\frac{1}{2})^7$

$\frac{1}{128}$

Describe and correct the error in evaluating the expression.

9. $27^{2/3} = (27^{1/3})^2 \neq 9^2 = 81$

$27^{1/3} = 3$

$3^2 = 9$

10. $256^{4/3} = (\sqrt[4]{256})^3 = 4^3 = 64$

$(\sqrt[3]{256})^4$

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Match the equivalent expressions. Explain your reasoning.

11. $(\sqrt[3]{5})^4$

12. $(\sqrt[4]{5})^3$

13. $\frac{1}{\sqrt[4]{5}}$

14. $-\sqrt[4]{5}$

A. $5^{-1/4}$

B. $5^{4/3}$

C. $-5^{1/4}$

D. $5^{3/4}$

Evaluate the expression using a calculator. Round your answer to two decimal places when appropriate.

15. $\sqrt[7]{1695}$

≈ 2.89

16. $85^{1/6}$

≈ 2.10

17. $25^{-1/3}$

≈ 0.34

18. $20736^{4/5}$

≈ 2840.40

19. $(\sqrt[4]{187})^3$

≈ 50.57

20. $(\sqrt[5]{-8})^8$

No Sol

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Use the properties of rational exponents to simplify the expression.

1. $(12^2)^{1/4}$

$12^{2/4}$

$12^{1/2}$

2. $\frac{7}{7^{1/3}}$

$7^{1-\frac{1}{3}} \Rightarrow 7^{\frac{3}{3}-\frac{1}{3}} \Rightarrow 7^{2/3}$

3. $\left(\frac{9^3}{6^3}\right)^{-1/3}$

$\left(\frac{6^3}{9^3}\right)^{1/3} \Rightarrow \frac{6^{3/3}}{9^{3/3}} \Rightarrow \frac{6}{9} = \frac{2}{3}$

4. $(5^{1/2} \cdot 5^{-3/2})^{-1/4}$

$\left(5^{\frac{1}{2}-\frac{3}{2}}\right)^{-1/4} \Rightarrow (5^{-1})^{-1/4}$

$5^{1/4}$

5. $\frac{2^{2/3} \cdot 16^{2/3}}{4^{2/3}}$

$\frac{32^{2/3}}{4^{2/3}} \Rightarrow 8^{2/3} \Rightarrow (8^{1/3})^2$

$(2)^2 = 4$

6. $\frac{49^{3/8} \cdot 49^{7/8}}{7^{5/4}}$

$\frac{49^{\frac{3}{8}+\frac{7}{8}}}{7^{5/4}} \Rightarrow \frac{49^{10/8}}{7^{5/4}} \Rightarrow \frac{49^{5/4}}{7^{5/4}} \Rightarrow$

$7^{5/4}$

Use the properties of radicals to simplify the expression.

7. $\sqrt[3]{16} \cdot \sqrt[3]{32}$

$\sqrt[3]{512}$

8

8. $\sqrt[4]{8} \cdot \sqrt[4]{8}$

$\sqrt[4]{64}$

$\sqrt[4]{16}\sqrt[4]{4}$

$2\sqrt[4]{4}$

9. $\frac{\sqrt{2}}{\sqrt{32}}$ $\sqrt{2}$ $\sqrt{2}$

$\frac{\sqrt{4}}{\sqrt{64}} = \frac{2}{8} = \frac{1}{4}$

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Write the expression in simplest form.

10. $\sqrt[4]{567}$

$\sqrt[4]{81}\sqrt[4]{7}$

$3\sqrt[4]{7}$

11. $\frac{\sqrt[4]{4}\sqrt[4]{3}}{\sqrt[4]{27}\sqrt[4]{3}}$

$\frac{\sqrt[4]{12}}{\sqrt[4]{81}} \Rightarrow \frac{\sqrt[4]{12}}{3}$

12. $\sqrt{\frac{3}{8}}$ $\frac{\sqrt{3}\sqrt{2}}{\sqrt{8}\sqrt{2}}$

$\frac{\sqrt{6}}{\sqrt{16}} \Rightarrow \frac{\sqrt{6}}{4}$

13. $\sqrt[3]{\frac{7}{4}}$

$\frac{\sqrt[3]{7}\sqrt[3]{2}}{\sqrt[3]{4}\sqrt[3]{2}} \Rightarrow \frac{\sqrt[3]{14}}{\sqrt[3]{8}} \Rightarrow$

$\frac{\sqrt[3]{14}}{2}$

14. $\sqrt[3]{\frac{64}{49}}$

$\frac{\sqrt[3]{64}}{\sqrt[3]{49}} \Rightarrow \frac{4}{\sqrt[3]{49}}\frac{\sqrt[3]{7}}{\sqrt[3]{7}}$

$\frac{4\sqrt[3]{7}}{\sqrt[3]{343}} \Rightarrow \frac{4\sqrt[3]{7}}{7}$

15. $\sqrt[4]{\frac{1296}{25}}$

$\frac{6}{\sqrt[4]{25}}\frac{\sqrt[4]{25}}{\sqrt[4]{25}} \Rightarrow \frac{6\sqrt[4]{25}}{\sqrt[4]{625}}$

$\frac{6\sqrt[4]{25}}{5}$

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Simplify the expression.

1. $8\sqrt[6]{5} - 12\sqrt[6]{5}$

$4\sqrt[6]{5}$

2. $13(8^{3/4}) - 4(8^{3/4})$

$9(8^{3/4})$

2. $7\sqrt[3]{2} - \sqrt[3]{128}$

$7\sqrt[3]{2} - \sqrt[3]{64}\sqrt[3]{2}$

$7\sqrt[3]{2} - 4\sqrt[3]{2}$

$3\sqrt[3]{2}$

4. $(5^{1/4}) + 6(405^{1/4})$

$(5^{1/4}) + 6(81^{1/4})(5^{1/4})$

$(5^{1/4}) + 6(3)(5^{1/4})$

$(5^{1/4}) + 18(5^{1/4})$

$19(5^{1/4})$

Simplify the expression.

5. $\sqrt[3]{64r^3t^6}$

$4rt^2$

6. $\sqrt[4]{\frac{r^{16}}{16s^6}}$

$\frac{\sqrt[4]{r^{16}}\sqrt[4]{s^2}}{\sqrt[4]{16^4}\sqrt[4]{s^2}} \Rightarrow \frac{\sqrt[4]{r^{16}s^2}}{\sqrt[4]{16s^8}}$

$\frac{r^4\sqrt[4]{s^2}}{2s^2}$

7. $\sqrt[6]{\frac{g^6h}{h^7}}$

$\frac{\sqrt[6]{g^6h}\sqrt[6]{h^5}}{\sqrt[6]{h^7}\sqrt[6]{h^5}} \Rightarrow \frac{\sqrt[6]{g^6h^6}}{\sqrt[6]{h^{12}}}$

$\frac{gh}{h^2} \Rightarrow \frac{g}{h}$

8. $\sqrt[8]{\frac{r^{18}p^7}{r^3p^{-1}}}$

$\sqrt[8]{r^{15}p^8}$

$rp\sqrt[8]{r^7}$

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Write the expression in simplest form. Assume all variables are positive.

9. $\sqrt{81a^7b^{12}c^9}$

$9a^3b^6c^4\sqrt{ac}$

10. $\sqrt[4]{\frac{405x^3y^3}{5x^{-1}y}}$

$\sqrt[4]{81x^4y^2}$

$3x\sqrt[4]{y^2}$

11. $\frac{\sqrt[4]{v^6}\sqrt[7]{v^2}}{\sqrt[7]{v^5}\sqrt[7]{v^2}}$

$\sqrt[4]{v^2}\sqrt[7]{v^2}$

Perform the indicated operation. Assume all variables are positive.

12. $11\sqrt{2z} - 5\sqrt{2z}$

$6\sqrt{2z}$

13. $7\sqrt[3]{m^7} + 3m^{7/3}$

$7\sqrt[3]{m^7} + 3\sqrt[3]{m^7}$

$10\sqrt[3]{m^7}$

14. $(p^{1/2} \cdot p^{1/4}) - \sqrt[4]{16p^3}$

$p^{\frac{2}{4}+\frac{1}{4}} - \sqrt[4]{16p^3}$

$p^{3/4} - 2\sqrt[4]{p^3}$

$\sqrt[4]{p^3} - 2\sqrt[4]{p^3}$

$-1\sqrt[4]{p^3}$

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Lesson 4, Day 1
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Solve the equation. Check your solution.

1. $(\sqrt{5x+1})^2 = (6)^2$

$5x+1 = 36$
$-1 \quad -1$
$\frac{5x}{5} = \frac{35}{5}$
$\boxed{x = 7}$

2. $\sqrt[3]{x} - 10 = 7$

$+10 \quad +10$
$(\sqrt[3]{x})^3 = (17)^3$
$\boxed{x = 4913}$

3. $8\sqrt[3]{10x} - 15 = 17$

$+15 \quad +15$
$\frac{8\sqrt[3]{10x}}{8} = \frac{32}{8}$
$(\sqrt[3]{10x})^3 = (4)^3$
$\frac{10x}{10} = \frac{64}{10}$
$\boxed{x = \frac{32}{5}}$

4. $\sqrt{2x} - \frac{2}{3} = 0$

$+\frac{2}{3} \quad +\frac{2}{3}$
$(\sqrt{2x})^2 = (\frac{2}{3})^2$
$2x = \frac{4}{9} \cdot \frac{1}{2}$
$\boxed{x = \frac{4}{18} \Rightarrow \frac{2}{9}}$

5. $(x-10)^2 = (\sqrt{9x})^2$

$x^2 - 10x - 10x + 100 = 9x$
$x^2 - 20x + 100 = 9x$
$-9x \quad -9x$
$x^2 - 29x + 100 = 0$
$(x-25)(x-4) = 0$
$x-25=0 \quad x-4=0$
$\boxed{x=25} \quad \boxed{x=4}$

6. $(\sqrt{2x+30})^2 = (x+3)^2$

$2x+30 = x^2+3x+3x+9$
$2x+30 = x^2+6x+9$
$-x^2-6x-9 \quad -x^2-6x-9$
$-x^2-4x+21 = 0$
$x^2+4x-21 = 0$
$(x+7)(x-4) = 0$
$x+7=0 \quad x-4=0$
$\boxed{x=-7} \quad \boxed{x=4}$

7. $(\sqrt[4]{3x - 8x^2})^4 = (2x)^4$

$3x - 8x^2 = 16x^4$
$-16x^4 \quad -16x^4$
$-16x^4 - 8x^2 + 3x = 0$
$16x^4 + 8x^2 - 3x = 0$
$(4x^2-1)(4x^2+3) = 0$
$(2x-1)(2x+1)(4x^2+3) = 0$
$2x-1=0 \quad 2x+1=0 \quad 4x^2+3=0$
$2x=1 \quad 2x=-1 \quad 4x^2=-3$
$x=1/2 \quad x=-1/2 \quad x^2=-3/4$
$\rightarrow \boxed{x = \pm i\frac{\sqrt{3}}{2}}$

8. $(\sqrt[3]{x+5})^3 = (2\sqrt[3]{2x+6})^3$

$x+5 = 8(2x+6)$
$x+5 = 16x+48$
$-16x \quad -5 \quad -16x \quad -5$
$\frac{-15x}{-15} = \frac{43}{-15}$
$\boxed{x = -\frac{43}{15}}$

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Solve the equation. Check your solution.

1. $\frac{2x^{2/3}}{2} = \frac{8}{2}$

$(x^{2/3})^{3/2} = (4)^{3/2}$

$x = 2^3$

$\boxed{x = 8}$

2. $\frac{4x^{3/2}}{4} = \frac{32}{4}$

$(x^{3/2})^{2/3} = (8)^{2/3}$

$x = 2^2$

$\boxed{x = 4}$

3. $2x^{3/4} - 14 = 40$

$+14 \quad +14$

$\frac{2x^{3/4}}{2} = \frac{54}{2}$

$(x^{3/4})^{4/3} = (27)^{4/3}$

$x = 3^4$

$\boxed{x = 81}$

4. $(5 - x)^{1/2} - 2x = 0$

$+2x \quad +2x$

$((5-x)^{1/2})^2 = (2x)^2$

$5 - x = 4x^2$

$-4x^2 \qquad -4x^2$

$-4x^2 - x + 5 = 0$

$4x^2 + x - 5 = 0$

$(4x+5)(x-1) = 0$

$4x + 5 = 0$ $\qquad$ $x - 1 = 0$

$4x = -5$ $\qquad$ $\boxed{x = 1}$

$\boxed{x = -\frac{5}{4}}$

5. $(5x^2 - 4)^{1/4} = (x)^4$

$5x^2 - 4 = x^4$

$-x^4 \qquad -x^4$

$-x^4 + 5x^2 - 4 = 0$

$x^4 - 5x + 4 = 0$

$(x^2 - 4)(x^2 - 1) = 0$

$(x-2)(x+2)(x-1)(x+1) = 0$

$x - 2 = 0$ $\quad$ $x + 2 = 0$ $\quad$ $x - 1 = 0$ $\quad$ $x + 1 = 0$

$\boxed{x = 2}$ $\quad$ $\boxed{x = -2}$ $\quad$ $\boxed{x = 1}$ $\quad$ $\boxed{x = -1}$

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Lesson 4, Day 2

Solve the Inequality.

7. $\sqrt[3]{x-4} \leq (5)^3$

$x-4 \leq 125$

$+4 \quad +4$

$x \leq 129$

8. $7\sqrt{x}+1 < 9$

$-1 \quad -1$

$\frac{7\sqrt{x}}{7} < \frac{8}{7}$

$(\sqrt{x})^2 < (\frac{8}{7})^2$

$x < \frac{64}{49}$

9. $(\sqrt[3]{x+7})^3 \geq (3)^3$

$x+7 \geq 27$

$-7 \quad -7$

$x \geq 20$

10. $-2\sqrt[3]{x+4} < 12$

$\frac{-2}{} \quad \frac{}{-2}$

$(\sqrt[3]{x+4})^3 > (-6)^3$

$x+4 > -216$

$-4 \quad -4$

$x > -220$

Solve the nonlinear system.

11. $y^2 = x - 3$

$y = x - 3$

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

$x^2-3x-3x+9 = x-3$

$x^2-6x+9 = x-3$

$-x \quad +3 \quad -x+3$

$x^2-7x+12 = 0$

$(x-4)(x-3) = 0$

$x-4=0 \quad x-3=0$

$x = 4 \quad x = 3$

$y = 4-3$

$y = 1$

$(4,1)$

$y = 3-3$

$y = 0$

$(3,0)$

12. $y^2 = 2x + 17$

$y = x + 5$

$(x+5)^2 = 2x+17$

$x^2+5x+5x+25 = 2x+17$

$x^2+10x+25 = 2x+17$

$-2x \quad -17 \quad -2x \quad -17$

$x^2+8x+8 = 0$

$\frac{-8 \pm \sqrt{(8)^2-4(1)(8)}}{2(1)} \Rightarrow \frac{-8 \pm \sqrt{64-32}}{2} \Rightarrow$

$\frac{-8 \pm \sqrt{32}}{2} \Rightarrow \frac{-8 \pm 4\sqrt{2}}{2} \Rightarrow -4 \pm 2\sqrt{2}$

$y = -4+2\sqrt{2}+5$

$y = 1+2\sqrt{2}$

$(-4+2\sqrt{2}, 1+2\sqrt{2})$

$y = -4-2\sqrt{2}+5$

$y = 1-2\sqrt{2}$

$(-4-2\sqrt{2}, 1-2\sqrt{2})$

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Find (f + g)(x) and (f - g)(x) ~~and state the domain of each~~. Then evaluate (f + g) and (f - g) for the given value of x.

1. $f(x) = -5\sqrt[4]{x}$; $g(x) = 19\sqrt[4]{x}$; $x = 16$

$(f+g) \rightarrow -5\sqrt[4]{x} + 19\sqrt[4]{x}$
$\Rightarrow \boxed{14\sqrt[4]{x}}$
$(f+g)(16) \rightarrow 14\sqrt[4]{16} \Rightarrow 14(2) = \boxed{28}$
$(f-g) \rightarrow -5\sqrt[4]{x} - 19\sqrt[4]{x}$
$\Rightarrow \boxed{-24\sqrt[4]{x}}$
$(f-g)(16) \rightarrow -24\sqrt[4]{16} \Rightarrow -24(2) = \boxed{-48}$

2. $f(x) = 6x - 4x^2 - 7x^3$; $g(x) = 9x^3 - 5x$; $x = -1$

$(f+g) \rightarrow (6x - 4x^2 - 7x^3) + (9x^3 - 5x)$
$\boxed{2x^3 - 4x^2 + x}$
$(f+g)(-1) \rightarrow 2(-1)^3 - 4(-1)^2 + (-1) \Rightarrow$
$2(-1) - 4(1) - 1 \Rightarrow -2 - 4 - 1 \Rightarrow \boxed{-7}$
$(f-g) \rightarrow (6x - 4x^2 - 7x^3) - (9x^3 - 5x)$
$\Rightarrow 6x - 4x^2 - 7x^3 - 9x^3 + 5x$
$\boxed{-16x^3 - 4x^2 + 11x}$
$(f-g)(-1) \Rightarrow -16(-1)^3 - 4(-1)^2 + 11(-1) \Rightarrow$
$-16(-1) - 4(1) - 11 \Rightarrow 16 - 4 - 11 = \boxed{1}$

3. $f(x) = \sqrt[3]{2x}$; $g(x) = -11\sqrt[3]{2x}$; $x = -4$

$(f+g) \rightarrow \sqrt[3]{2x} + (-11\sqrt[3]{2x})$
$\boxed{-10\sqrt[3]{2x}}$
$(f+g)(-4) \Rightarrow -10\sqrt[3]{2(-4)} \Rightarrow -10\sqrt[3]{-8}$
$\Rightarrow -10(-2) = \boxed{20}$
$(f-g) \rightarrow \sqrt[3]{2x} - (-11\sqrt[3]{2x})$
$\boxed{12\sqrt[3]{2x}}$
$(f-g)(-4) \Rightarrow 12\sqrt[3]{2(-4)} \Rightarrow 12\sqrt[3]{-8}$
$\Rightarrow 12(-2) = \boxed{-24}$

4. $g(x) = 11x + 2x^2$; $g(x) = -7x - 3x^2 + 4$; $x = 2$

$(f+g) \rightarrow 11x + 2x^2 + (-7x - 3x^2 + 4)$
$\Rightarrow 11x + 2x^2 - 7x - 3x^2 + 4$
$\Rightarrow \boxed{-x^2 + 4x + 4}$
$(f+g)(2) \Rightarrow -(2)^2 + 4(2) + 4 \Rightarrow -4 + 8 + 4$
$\boxed{8}$
$(f-g) \rightarrow (11x + 2x^2) - (-7x - 3x^2 + 4)$
$\Rightarrow 11x + 2x^2 + 7x + 3x^2 - 4$
$\Rightarrow \boxed{5x^2 + 18x - 4}$
$(f-g)(2) \Rightarrow 5(2)^2 + 18(2) - 4$
$\Rightarrow 5(4) + 36 - 4$
$\Rightarrow 20 + 36 - 4$
$\Rightarrow \boxed{52}$

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Find $(fg)(x)$ and $\left(\frac{f}{g}\right)(x)$ ~~and state the domain and range of each~~. Then evaluate (fg) and $\left(\frac{f}{g}\right)$ for the given value of x.

5. $f(x) = x^4$; $g(x) = 9x^{1/2}$

$x = 9$

$(fg) \Rightarrow x^4(9x^{1/2}) \Rightarrow 9x^{\frac{8}{2}+\frac{1}{2}} \Rightarrow \boxed{9x^{9/2}}$

$(fg)(9) \Rightarrow 9(9)^{9/2} \Rightarrow 9(3)^9 \Rightarrow$

$9(19683) = \boxed{177,147}$

$\left(\frac{f}{g}\right) \Rightarrow \frac{x^4}{9x^{1/2}} \Rightarrow \frac{1}{9}\left(x^{\frac{8}{2}-\frac{1}{2}}\right) \Rightarrow \boxed{\frac{1}{9}x^{7/2}}$

$\left(\frac{f}{g}\right)(9) = \frac{1}{9}(9)^{7/2} \Rightarrow \frac{1}{9}(3)^7 \Rightarrow$

$\frac{1}{9}(2187) = \boxed{243}$

6. $f(x) = 11x^3$; $g(x) = 7x^{7/3}$;

$x = -8$

$(fg) \rightarrow 11x^3(7x^{7/3}) \Rightarrow 77x^{\frac{9}{3}+\frac{7}{3}}$

$\boxed{77x^{\frac{16}{3}}}$

$(fg)(-8) \Rightarrow 77(-8)^{16/3} \Rightarrow 77(-2)^{16}$

$\Rightarrow 77(65536) \Rightarrow$

$\boxed{5046272}$

$\left(\frac{f}{g}\right) \rightarrow \frac{11x^3}{7x^{7/3}} \Rightarrow \frac{11}{7}\left(x^{\frac{9}{3}-\frac{7}{3}}\right)$

$= \boxed{\frac{11}{7}x^{\frac{2}{3}}}$

$\left(\frac{f}{g}\right)(-8) = \frac{11}{7}(-8)^{2/3} \Rightarrow \frac{11}{7}(-2)^2$

$\Rightarrow \frac{11}{7}(4) = \boxed{\frac{44}{7}}$

7. $f(x) = 4x^{5/4}$; $g(x) = 2x^{1/2}$;

$x = 16$

$(fg) \rightarrow 4x^{5/4} \cdot 2x^{1/2} \Rightarrow 8\left(x^{\frac{5}{4}+\frac{2}{4}}\right)$

$= \boxed{8x^{7/4}}$

$(fg)(16) \Rightarrow 8(16)^{7/4} \Rightarrow 8(2)^7$

$\Rightarrow 8(128) = \boxed{1024}$

$\left(\frac{f}{g}\right) \rightarrow \frac{4x^{5/4}}{2x^{1/2}} \Rightarrow 2x^{5/4-2/4} \Rightarrow \boxed{2x^{3/4}}$

$\left(\frac{f}{g}\right)(16) \rightarrow 2(16)^{3/4} \Rightarrow 2(2)^3 \Rightarrow$

$2(8) = \boxed{16}$

8. $f(x) = 7x^{3/2}$; $g(x) = -14x^{1/2}$;

$x = 64$

$(fg) \Rightarrow 7x^{3/2} \cdot -14^{1/2} \Rightarrow -98x^{\frac{3}{2}+\frac{1}{2}}$

$\Rightarrow -98x^{\frac{4}{2}} = \boxed{-98x^2}$

$(fg)(64) \Rightarrow -98(64)^2 \Rightarrow -98(4096)$

$= \boxed{-401408}$

$\left(\frac{f}{g}\right) \Rightarrow \frac{7x^{3/2}}{-14x^{1/2}} = -\frac{1}{2}x^{3/2-1/2} \Rightarrow$

$-\frac{1}{2}x^{\frac{2}{2}} = \boxed{-\frac{1}{2}x}$

$\left(\frac{f}{g}\right)(64) \Rightarrow -\frac{1}{2}(64) \Rightarrow \boxed{-32}$

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Lesson 6, Day 1
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Solve for y = f(x) for x. Then find the input(s) when the output is -3.

1. $F(x) = 3x + 5$

$y = 3x + 5$
$-5 \quad -5$
$\frac{y-5}{3} = \frac{3x}{3}$
$\boxed{\frac{y-5}{3} = x}$

$\frac{-3-5}{3} = x$
$\boxed{-\frac{8}{3} = x}$

2. $F(x) = -7x - 2$

$y = -7x - 2$
$+2 \quad +2$
$\frac{y+2}{-7} = \frac{-7x}{-7}$
$\boxed{\frac{y+2}{-7} = x}$

$\frac{-3+2}{-7} = x$
$\frac{-1}{-7} = x$
$\boxed{\frac{1}{7} = x}$

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

$y = \frac{1}{2}x - 3$
$+3 \quad +3$
$2(y+3) = \frac{1}{2}x(2)$
$\boxed{2y + 6 = x}$

$2(-3) + 6 = x$
$-6 + 6 = x$
$\boxed{0 = x}$

4. $F(x) = \frac{2}{3}x + 1$

$y = \frac{2}{3}x + 1$
$-1 \quad -1$
$\frac{3}{2}(y-1) = \frac{2}{3}x(\frac{3}{2})$
$\boxed{\frac{3}{2}y - \frac{3}{2} = x}$

$-\frac{3}{2}(-3) + \frac{3}{2} = x$
$\frac{9}{2} + \frac{3}{2} = x$
$\frac{12}{2} = x$
$\boxed{6 = x}$

5. $f(x) = 2x^4 - 5$

$y = 2x^4 - 5$
$+5 \quad +5$
$\frac{y+5}{2} = \frac{2x^4}{2}$
$\sqrt[4]{\frac{y+5}{2}} = \sqrt[4]{x^4}$
$\boxed{\pm\sqrt[4]{\frac{y+5}{2}} = x}$

$\pm\sqrt[4]{\frac{-3+5}{2}} = x$
$\pm\sqrt[4]{\frac{2}{2}} = x$
$\pm\sqrt[4]{1} = x$
$\boxed{\pm 1 = x}$

6. $F(x) = (x-5)^3 - 1$

$y = (x-5)^3 - 1$
$+1 \quad +1$
$\sqrt[3]{y+1} = \sqrt[3]{(x-5)^3}$
$\sqrt[3]{y+1} = x - 5$
$+5 \quad +5$
$\boxed{5 + \sqrt[3]{y+1} = x}$

$5 + \sqrt[3]{-3+1} = x$
$5 + \sqrt[3]{-2} = x$
$\boxed{5 + i\sqrt[3]{2} = x}$

College Algebra – Chapter 5
Lesson 6, Day 1

Find the inverse of the function.

7. $f(x) = \frac{1}{3}x - 1$

$y = \frac{1}{3}x - 1$

$x = \frac{1}{3}y - 1$

$+1 \quad +1$

$3(x+1) = \frac{1}{3}y\,(3)$

$3x + 3 = y$

8. $F(x) = -\frac{4}{5}x + \frac{1}{5}$

$y = -\frac{4}{5}x + \frac{1}{5}$

$x = -\frac{4}{5}y + \frac{1}{5}$

$-\frac{1}{5} \quad -\frac{1}{5}$

$-\frac{5}{4}\left(x - \frac{1}{5}\right) = -\frac{4}{5}y\,\left(-\frac{5}{4}\right)$

$-\frac{5}{4}x + \frac{1}{4} = y$

Determine whether each pair of functions f and g are inverses. Explain your reasoning.

9.

x	-2	-1	0	1	2
y	-2	1	4	7	10

x	-2	1	4	7	10
y	-2	-1	0	1	2

Yes, inverses

10.

x	2	3	4	5	6
y	8	6	4	2	0

x	2	3	4	5	6
y	-8	-6	-4	2	0

No

11.

x	-4	-2	0	2	4
y	2	10	18	26	34

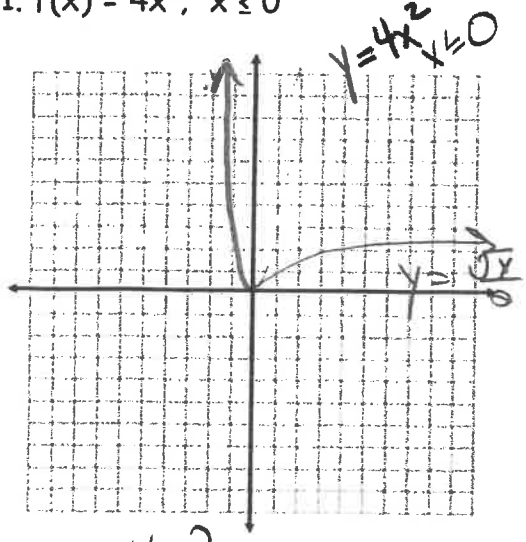
x	-4	-2	0	2	4
y	$\frac{1}{2}$	1/10	1/18	1/26	1/34

No

College Algebra – Chapter 5
Lesson 6, Day2
Name _____

Find the inverse of the function. Then graph the function and its inverse.

1. $f(x) = 4x^2;\ x \le 0$

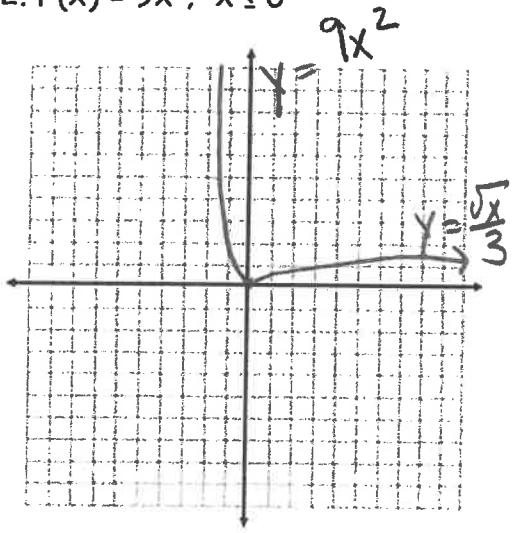


$\frac{x}{4} = \frac{4y^2}{4}$

$\pm\sqrt{\frac{x}{4}} = \sqrt{y^2}$

$\frac{\pm\sqrt{x}}{2} = y$

2. $F(x) = 9x^2;\ x \le 0$



$\frac{x}{9} = \frac{9y^2}{9}$

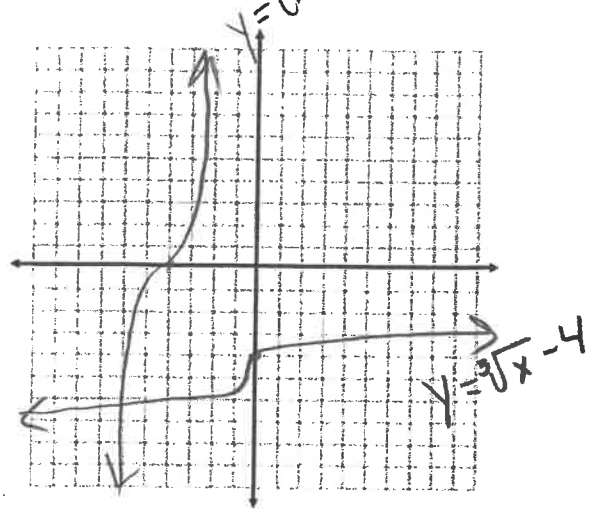
$\sqrt{\frac{x}{9}} = \sqrt{y^2}$

$-\frac{\sqrt{x}}{3} = y$

College Algebra – Chapter 5

Lesson 6, Day2

3. $f(x) = (x + 4)^3$



$y = (x+4)^3$

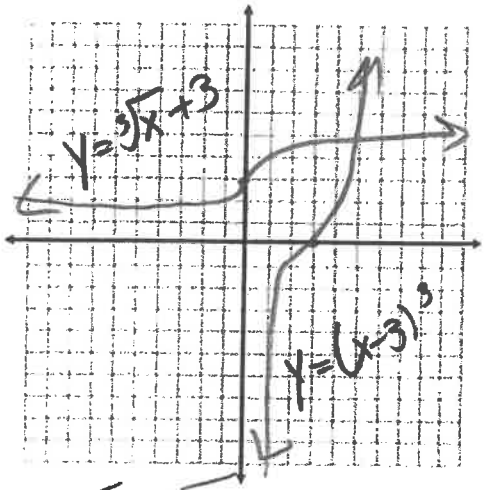
$\sqrt[3]{x} = \sqrt[3]{(y+4)^3}$

$\sqrt[3]{x} = y + 4$

$-4 \quad -4$

$\sqrt[3]{x} - 4 = y$

4. $F(x) = (x - 3)^3$



$\sqrt[3]{x} = \sqrt[3]{(y-3)^3}$

$\sqrt[3]{x} = y - 3$

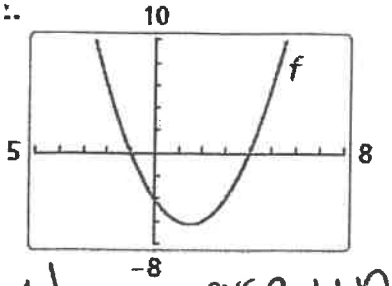
$+3 \quad +3$

$\sqrt[3]{x} + 3 = y$

College Algebra – Chapter 5
Lesson 6, Day2

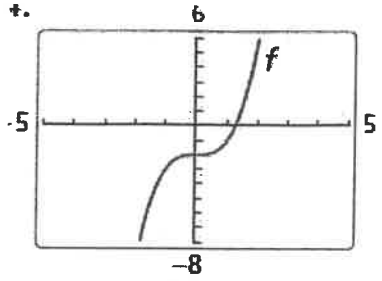
Use the graph to determine whether the inverse of f is a function. Explain your reasoning.

5.



No inverse, unless you restrict the domain

6.



Yes, has an inverse
-passes horizontal line test

Determine whether the functions are inverses.

7. $f(x) = 2x - 9$; $g(x) = \frac{x}{2} + 9$

$2(\frac{x}{2}+9)-9$
$x+18-9$
$x+9$ X

$\frac{2x-9}{2}+9$
$\frac{2x}{2}-\frac{9}{2}+9$
$x-\frac{9}{2}+9$ X

Not inverses

8. $F(x) = \frac{x-3}{4}$; $g(x) = 4x + 3$

$4(\frac{x-3}{4})+3$
$x-3+3$
x ✓

$\frac{4x+3-3}{4}$
$\frac{4x}{4}$
x ✓

Yes!

9. $f(x) = \sqrt[5]{\frac{x+9}{5}}$; $g(x) = 5x^5 - 9$

$5(\sqrt[5]{\frac{x+9}{5}})^5-9$
$5(\frac{x+9}{5})-9$
$x+9-9$
x ✓

$\sqrt[5]{\frac{5x^5-9+9}{5}}$
$\sqrt[5]{\frac{5x^5}{5}}$
$\sqrt[5]{x^5}$
x ✓

Yes!

10. $F(x) = 7x^{3/2} - 4$; $g(x) = (\frac{x+4}{7})^{3/2}$

$(\frac{7x^{3/2}+4}{7})^{3/2}$
$(\frac{7x^{3/2}}{7}+\frac{4}{7})^{3/2}$
$(x^{\frac{3}{2}}+\frac{4}{7})^{3/2}$ X

Not Inverses

College Algebra – Chapter 6
Lesson 1, Day 1

Name Answer Key Date _____

Evaluate the expression for (a) $x = -2$ and (b) $x = 3$.

1. 2^x

2^{-2} 2^3

$\frac{1}{2^2}$ 8

$\frac{1}{4}$

2. 4^x

4^{-2} 4^3

$\frac{1}{4^2}$ 64

$\frac{1}{16}$

3. $8(3^x)$

$8(3^{-2})$ $8(3^3)$

$8(\frac{1}{3^2})$ $8(27)$

$8(\frac{1}{9})$ 216

$\frac{8}{9}$

4. $6(2^x)$

$6(2^{-2})$ $6(2^3)$

$6(\frac{1}{2^2})$ $6(8)$

$6(\frac{1}{4})$ 48

$\frac{6}{4} = \frac{3}{2}$

5. $5 + 3^x$

$5+3^{-2}$ $5+3^3$

$5+\frac{1}{3^2}$ $5+27$

$5+\frac{1}{9} \Rightarrow \frac{45}{9}+\frac{1}{9}$ 32

$\frac{46}{9}$

6. $2^x - 2$

$2^{-2}-2$ 2^3-2

$\frac{1}{2^2}-2$ $8-2$

$\frac{1}{4}-2 \Rightarrow \frac{1}{4}-\frac{8}{4}$ 6

$-\frac{7}{4}$

Tell whether the function represents *exponential growth* or *exponential decay*. Then fill out the given X- Y-Chart.

7. $y = 7^x$

X	Y
-2	$\frac{1}{49}$
-1	$\frac{1}{7}$
0	1
1	7
2	49

Exp. Growth

8. $y = (\frac{1}{8})^x$

X	Y
-2	64
-1	8
0	1
1	$\frac{1}{8}$
2	$\frac{1}{64}$

Exp. Decay

College Algebra – Chapter 6
Lesson 1, Day 1

9. $y = (\frac{2}{5})^x$

X	Y
-2	$\frac{25}{4}$
-1	$\frac{5}{2}$
0	1
1	$\frac{2}{5}$
2	$\frac{4}{25}$

Exp. Decay

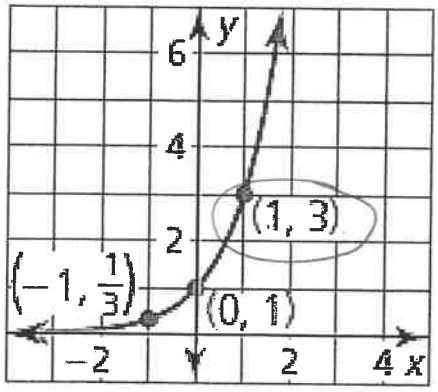
10. $y = (0.75)^x$

X	Y
-2	1.78
-1	1.33
0	1
1	.75
2	.56

Exp. Decay

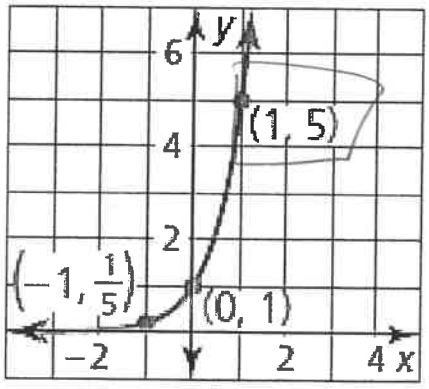
Use the graph of $f(x) = b^x$ to identify the value of the base b.

11.



b=3

12.



b=5

College Algebra – Chapter 6
Lesson 2

Name _____ Date _____

Simplify the expression.

1. $e^{-4} \cdot e^{6}$

e^{2}

2. $\frac{27e^{7}}{3e^{4}}$

$9e^{3}$

3. $(4e^{-2x})^{3}$

$64e^{-6x}$

$\frac{64}{e^{6x}}$

4. $\sqrt[3]{8e^{12x}}$

$2e^{4x}$

5. $e^{x} \cdot e^{-6x} \cdot e^{8}$

e^{x-6x+8}

e^{-5x+8}

6. $e^{x} \cdot e^{4} \cdot e^{x+3}$

$e^{x+4+x+3}$

e^{2x+7}

Describe and correct the error in simplifying the expression.

7.

$(4e^{3x})^{2} = 4e^{(3x)(2)}$ Need to square

$= 4e^{6x}$

4

$16e^{6x}$

8.

$\frac{e^{5x}}{e^{-2x}} = e^{5x-2x}$ Need to subtract

$= e^{3x}$

$e^{5x+(+2x)}$

e^{7x}

College Algebra – Chapter 6

Lesson 2

Tell whether the function represents *exponential growth* or *exponential decay*. Then fill in the x-y chart.

9. $y = e^{-2}$.

Exp. Decay

X	y
-2	.14
-1	.37
0	1
1	2.72
2	7.39

10. $y = 3e^{2x}$

Exp. Growth

X	y
-2	.05
-1	.41
0	3
1	22.17
2	163.79

Use the properties of exponents to rewrite the function in the form $y = a(1 + r)^t$ or $y = a(1 - r)^t$. Then find the percent rate of change.

11. $y = 2e^{0.4t}$

$y = 2(1.49)^t$

$y = 2(1+0.49)^t$

49% rate of Change

12. $y = 0.5e^{0.8t}$

$y = 0.5(2.23)^t$

$y = 0.5(1+1.23)^t$

123% rate of Change

College Algebra – Chapter 6
Lesson 3, Day 1

Name _____ Date _____

Rewrite the equation in exponential form.

1. $log_3 9 = 2$

$3^2 = 9$

2. $log_7 343 = 3$

$7^3 = 343$

3. $log_3 \frac{1}{3} = -1$

$3^{-1} = \frac{1}{3}$

4. $log_{1/2} 16 = -4$

$\frac{1}{2}^{-4} = 16$

Rewrite the equation in logarithmic form.

5. $6^2 = 36$

$\log_6 36 = 2$

6. $5^{-2} = \frac{1}{25}$

$\log_5 \frac{1}{25} = -2$

7. $49^{1/2} = 7$

$\log_{49} 7 = \frac{1}{2}$

8. $125^{2/3} = 25$

$\log_{125} 25 = \frac{2}{3}$

Evaluate the logarithm.

9. $log_7 49$

2

10. $log_{1/2} 1$

0

11. $log_8 \frac{1}{512}$

-3

12. $log_4 0.25$

$\log_4 \frac{1}{4}$

-1

College Algebra – Chapter 6
Lesson 3, Day 1

Evaluate the logarithm using a calculator. Round your answer to three decimal places.

13. $ln\ \frac{1}{3}$

-1.099

14. $ln\frac{2}{7}$

-1.253

15. 3 ln 0.5

-2.079

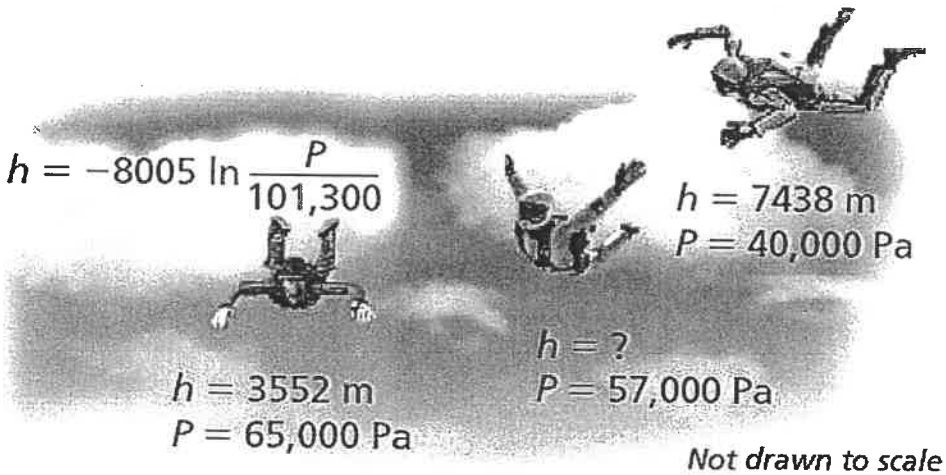
16. Log 0.6 + 1

$.778$

Skydivers use an instrument called an *altimeter* to track their altitude as they fall. The altimeter determines altitude by measuring air pressure. The altitude h (in meters) above sea level is related to the air pressure P (in pascals) by the function shown in the digram. What is the altitude above sea level in the missing problem?

$h = -8005 \ln \frac{65000}{101,300}$

≈ 3551.8



Not drawn to scale

The pH value for a substance measures how acidic or alkaline the substance is. It is given by the formula pH = -log[H^+], where H^+ is the hydrogen ion concentration (in moles per liter). Find the pH of each substance.

a. Baking soda: [H^+] = 10^{-8} moles per liter

$pH = -\log(10^{-8}) \Rightarrow 8$

b. Vinegar: [H^+] = 10^{-3} moles per liter

$pH = -\log(10^{-3}) \Rightarrow 3$

College Algebra – Chapter 6
Lesson 3, Day 2

Name _____ Date _____

Simplify the expression.

1. $7^{\log_7 x}$

x

2. $10^{\log 15}$

15

3. $e^{\ln 4}$

4

4. $\ln e^{x+1}$

$x+1$

Find the inverse of the function.

5. $y = 0.3^x$

$x = 0.3^y$

$\log_{0.3} x = \log_{0.3} 0.3^y$

$\log_{0.3} x = y$

6. $y = 11^x$

$x = 11^y$

$\log_{11} x = \log_{11} 11^y$

$\log_{11} x = y$

7. $y = \log_{1/5} x$

$x = \log_{1/5} x$

$\left(\frac{1}{5}\right)^x = \left(\frac{1}{5}\right)^{\log_{1/5} y}$

$\left(\frac{1}{5}\right)^x = y$

8. $y = \ln 2x$

$x = \ln 2y$

$e^x = e^{\ln 2y}$

$\frac{e^x}{2} = \frac{2y}{2}$

$\frac{e^x}{2} = y$

9. $y = e^{x-4}$

$x = e^{y-4}$

$\ln x = \ln e^{y-4}$

$\ln x = y - 4$

$+4 \quad +4$

$\ln x + 4 = y$

10. $y = 13 + \log x$

$x = 13 + \log x$

$-13 \quad -13$

$x - 13 = \log x$

$10^{x-13} = 10^{\log x}$

$10^{x-13} = y$

College Algebra – Chapter 6
Lesson 3, Day 2

Fill out the x-y chart.

11. $y = log_2 x - 1$

X	Y
-2	.5
-1	1
0	2
1	4
2	8

$x = \log_2 y - 1$
$+1 \quad +1$
$x + 1 = \log_2 y$
$2^{x+1} = 2^{\log_2 y}$
$2^{x+1} = y$

12. $y = log_3(x + 2)$

X	Y
-2	-1.9
-1	-1.7
0	-1
1	1
2	7

$x = \log_3 (y + 2)$
$3^x = 3^{\log_3 (y+2)}$
$3^x = y + 2$
$-2 \quad -2$
$3^x - 2 = y$

13. Your friend states that every logarithmic function will pass through the point (1, 0). Is your friend correct? Explain your reasoning.

No. Any logarithmic function of the form $f(x) = \log_b x$ will pass through (1,0), but any function that has been translated, or reflected in the x-axis would not pass through (1,0).

College Algebra – Chapter 6
Lesson 5, Day 1

Name _____ Date _____

Use $\log_7 4 \approx 0.712$ and $\log_7 12 \approx 1.277$ to evaluate the logarithm.

1. $\log_7 3$

$\log_7 \frac{12}{4} \Rightarrow$

$\log_7 12 - \log_7 4$

$1.277 - 0.712$

$.565$

2. $\log_7 48$

$\log_7 4 \cdot 12$

$\log_7 4 + \log_7 12$

$0.712 + 1.277$

1.989

3. $\log_7 16$

$\log_7 4^2 \Rightarrow 2\log_7 4$

$2(0.712)$

1.424

4. $\log_7 64$

$\log_7 4^3 \Rightarrow 3\log_7 4$

$3(0.712)$

2.136

5. $\log_7 \frac{1}{4}$

$\log_7 \frac{12}{4 \cdot 12}$

$\log_7 12 - (\log_7 4 + \log_7 12)$

$1.277 - (0.712 + 1.277)$

$-.712$

6. $\log_7 \frac{1}{3}$

$\log_7 \frac{4}{12} \Rightarrow \log_7 4 - \log_7 12$

$0.712 - 1.277$

$-.565$

Match the expression with the logarithm that has the same value. Justify your answer.

7. $\log_3 6 - \log_3 2$

$\log_3 \frac{6}{2} = \log_3 3$

8. $2\log_3 6$

$\log_3 6^2 = \log_3 36$

9. $6\log_3 2$

$\log_3 2^6 = \log_3 64$

10. $\log_3 6 + \log_3 2$

$\log_3 6 \cdot 2 = \log_3 12$

A. $\log_3 64$

B. $\log_3 3$

C. $\log_3 12$

D. $\log_3 36$

College Algebra – Chapter 6
Lesson 5, Day 1

Expand the logarithmic expression.

11. $\log_3 4x$

$\log_3 4 + \log_3 x$

12. $\ln 3x^4$

$\ln 3 + 4 \ln x$

13. $\ln \frac{6x^2}{y^4}$

$(\ln 6 + 2\ln x) - 4\ln y$

14. $\log_5 \sqrt[3]{x^2 y}$

$\log_5 x^{2/3} y^{1/3}$

$\frac{2}{3}\log_5 x + \frac{1}{3}\log_5 y$

Condense the logarithmic expression.

15. $\ln 12 - \ln 4$

$\ln \frac{12}{4}$

$\ln 3$

16. $2 \log x + \log 11$

$\log x^2 (11)$

$\log 11x^2$

17. $6 \ln 2 - 4 \ln y$

$\frac{\ln 2^6}{\ln y^4} = \ln \frac{64}{y^4}$

18. $5 \ln 2 + 7 \ln x + 4 \ln y$

$\ln 2^5 + \ln x^7 + \ln y^4$

$\ln 32x^7y^4$

19. $\log_5 3 + \frac{1}{3}\log_5 x$

$\log_5 3 + \log_5 x^{\frac{1}{3}}$

$\log_5 3x^{\frac{1}{3}}$

20. $\log_3 4 + 2\log_3 \frac{1}{2} + \log_3 x$

$\log_3 4 + \log_3 (\frac{1}{2})^2 + \log_3 x$

$\log_3 4(\frac{1}{4})x$

$\log_3 x$

College Algebra – Chapter 6
Lesson 5, Day 2

Name _____ Date _____

1. Which of the following is *not* equivalent to $\log_5 \frac{y^4}{3x}$? Justify your answer.

① $4\log_5 y - \log_5 3x$ $4\log_5 y - (\log_5 3 + \log_5 x)$

② $4\log_5 y - \log_5 3 + \log_5 x$ would need to distribute - thru

③ $4\log_5 y - \log_5 3 - \log_5 x$

④ $\log_5 y^4 - \log_5 3 - \log_5 x$

2. Which of the following equations is correct? Justify your answer.

① $\log_7 x + 2\log_7 y = \log_7(x + y^2)$

② $9\log x - 2\log y = \log \frac{x^9}{y^2}$ – yes

③ $5\log_4 x + 7\log_2 y = \log_6 x^5 y^7$ – no

④ $\log_9 x - 5\log_9 y = \log_9 \frac{x}{5y}$ would need to be a power

Use the change-of-base formula to evaluate the logarithm.

3. $\log_4 7$

$\frac{\log 7}{\log 4} \approx 1.403$

4. $\log_5 13$

$\frac{\log 13}{\log 5} \approx 1.594$

5. $\log_8 22$

$\frac{\log 22}{\log 8} \approx 1.486$

6. $\log_2 28$

$\frac{\log 28}{\log 2} \approx 4.807$

7. $\log_7 \frac{3}{16}$

$\frac{\log \frac{3}{16}}{\log 7} \approx -.860$

8. $\log_3 \frac{9}{40}$

$\frac{\log \frac{9}{40}}{\log 3} = -1.358$

College Algebra – Chapter 6

Lesson 5, Day 2

9. Let $f(x) = x^4$ and $g(x) = x^2$. Find $(fg)(x)$. Then evaluate the product when $x = 3$.

$(fg)(x) = x^4 \cdot x^2$

$= \boxed{x^6}$

$f(3) = 3^6$

$= \boxed{729}$

10. Let $f(x) = 4x^6$ and $g(x) = 2x^3$. Find $\left(\frac{f}{g}\right)(x)$. Then evaluate the quotient when $x = 5$.

$\left(\frac{f}{g}\right)(x) = \frac{4x^6}{2x^3}$

$= \boxed{2x^3}$

$f(5) = 2(5)^3$

$= 2(125)$

$= \boxed{250}$

11. Let $f(x) = 6x^3$ and $g(x) = 8x^3$. Find $(f + g)(x)$. Then evaluate the sum when $x = 2$.

$(f+g)(x) = 6x^3 + 8x^3$

$= \boxed{14x^3}$

$f(2) = 14(2)^3$

$= 14(8)$

$= \boxed{112}$

12. Let $f(x) = 2x^2$ and $g(x) = 3x^2$. Find $(f - g)(x)$. Then evaluate the different when $x = 6$.

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

$= \boxed{-x^2}$

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

$= \boxed{-36}$

College Algebra – Chapter 6
Lesson 6, Day 1

Name _____ Date _____

Solve the equation.

1. $7^{3x+5} = 7^{1-x}$

$3x+5=1-x$
$+x \quad -5 \quad -5 \quad +x$
$\frac{4x}{4} = \frac{-4}{4}$
$x = -1$

2. $6^{2x-6} = 36^{3x-5}$

$6^{2x-6} = 6^{2(3x-5)}$
$2x-6 = 2(3x-5)$
$2x-6 = 6x-10$
$-6x \quad +6 \quad -6x \quad +6$
$\frac{-4x}{-4} = \frac{-4}{-4}$
$x = 1$

3. $5^x = 33$

$\log_5 5^x = \log_5 33$
$x = \log_5 33$
$x = \frac{\log 33}{\log 5}$
≈ 2.17

4. $512^{5x-1} = \left(\frac{1}{8}\right)^{-4-x}$

$\left(\frac{1}{8}\right)^{-3(5x-1)} = \frac{1}{8}^{-4-x}$
$-3(5x-1) = -4-x$
$-15x+3 = -4-x$
$+x \quad -3 \quad -3 \quad +x$
$\frac{-14x}{-14} = \frac{-7}{-14}$
$x = \frac{1}{2}$

5. $11^{6x} = 38$

$\log_{11} 11^{6x} = \log_{11} 38$
$6x = \log_{11} 38$
$6x = \frac{\log 38}{\log 11}$
$\frac{6x}{6} \approx \frac{1.517}{6}$
$\approx .253$

6. $2e^{2x} - 7 = 5$
$+7 \quad +7$
$\frac{2e^{2x}}{2} = \frac{12}{2}$
$e^{2x} = 6$
$\ln e^{2x} = \ln 6$
$2x = \ln 6$
$\frac{2x}{2} \approx \frac{1.792}{2}$
$x \approx .896$

College Algebra – Chapter 6

Lesson 6, Day 1

7. The length l (in centimeters) of a scalloped hammerhead shark can be modeled by the function $l = 266 - 219e^{-0.05t}$, where t is the age (in years) of the shark. How old is a shark that is 175 centimeters long?

$l = 266 - 219e^{-0.05t}$

$175 = 266 - 219e^{-0.05t}$

$-266 \quad -266$

$\frac{-91}{-219} = \frac{-219e^{-0.05t}}{-219}$

$.416 \approx e^{-0.05t}$

$\ln .416 \approx \ln e^{-0.05t}$

$\frac{-.877}{-0.05} \approx \frac{-0.05t}{-0.05}$

≈ 17.54 years

8. One hundred grams of radium are stored in a container. The amount R (in grams) of radium present after t years can be modeled by $R = 100e^{-0.00043t}$. After how many years will only 5 grams of radium be present?

$R = 100e^{-0.00043t}$

$\frac{5}{100} = \frac{100e^{-0.00043t}}{100}$

$.05 = e^{-0.00043t}$

$\ln .05 = \ln e^{-0.00043t}$

$\frac{-.693}{-0.00043} \approx \frac{-0.00043t}{-0.00043}$

1611.627 years

9. You are driving on a hot day when your car overheats and stops running. The car overheats at 280°F and can be driven again at 230°F. When it is 80°F outside, the cooling rate of the car is r = 0.0058. How long do you have to wait until you can continue driving?

Don't have equation → Sorry!

College Algebra – Chapter 6
Lesson 6, Day 2

Name _____ Date _____

Solve the equation.

1. $\ln(4x - 7) = \ln(x + 11)$

$4x-7=x+11$
$-x+7 \quad -x+7$
$\frac{3x}{3}=\frac{18}{3}$
$x=6$

2. $\log_2(3x - 4) = \log_2 5$

$3x-4=5$
$+4 \quad +4$
$\frac{3x}{3}=\frac{9}{3}$
$x=3$

3. $\log(7x + 3) = \log 38$

$7x+3=38$
$-3 \quad -3$
$\frac{7x}{7}=\frac{35}{7}$
$x=5$

4. $\log_3(2x + 1) = 2$

$\log_3(2x+1)=\log_3 9$
$2x+1=9$
$-1 \quad -1$
$\frac{2x}{2}=\frac{8}{2}$
$x=4$

5. $\log_5(5x + 10) = 4$

$\log_5(5x+10)=\log_5 625$
$5x+10=625$
$-10 \quad -10$
$\frac{5x}{5}=\frac{615}{5}$
$x=123$

6. $\log_6(5x + 9) = \log_6 6x$

$5x+9=6x$
$-5x \quad -5x$
$9=x$

7. $\log(12x - 9) = \log 3x$

$12x-9=3x$
$-12x \quad -12x$
$\frac{-9}{-9}=\frac{-9x}{-9}$
$1=x$

8. $\log_3(x^2 + 9x + 27) = 2$

$\log_3(x^2+9x+27)=\log_3 9$
$x^2+9x+27=9$
$-9 \quad -9$
$x^2+9x+18=0$
$(x+3)(x+6)=0$
$x=-3 \quad x=-6$

College Algebra – Chapter 6
Lesson 6, Day 2

Solve the equation. Check for extraneous solutions.

9. $\ln x + \ln(x - 2) = 5$

$\ln x(x-2) = 5$

$e^{\ln x(x-2)} = e^5$

$x^2 - 2x = 148.4$

$x^2 - 2x - 148.4 = 0$

$a=1 \quad b=-2 \quad c=-148.4$

$\frac{-(-2) \pm \sqrt{(-148.4)^2 - 4(1)(-2)}}{2(1)}$

$\frac{2 \pm \sqrt{22022.56 + 8}}{2}$

$\frac{2 \pm \sqrt{22030.56}}{2}$

$\frac{2 + \sqrt{22030.56}}{2}$

$76, 21$

$\frac{2 - \sqrt{22030.56}}{2}$

$-72, 21$

10. $\log_4(-x) + \log_4(x + 10) = 2$

$\log_4 -x(x+10) = 2$

$4^{\log_4 -x^2-10x} = 4^2$

$-x^2 - 10x = 16$

$-16 \quad -16$

$-x^2 - 10x - 16 = 0$

$x^2 + 10x + 16 = 0$

$(x+8)(x+2) = 0$

$x = -8 \quad x = -2$

Solve the inequality.

11. $9^x > 54$

$\log_9 9^x = \log_9 54$

$x > \log_9 54$

$x > \frac{\log 54}{\log 9}$

$x > 1,815$

12. $\log_4 x < 4$

$4^{\log_4 x} < 4^4$

$x < 256$

13. $e^{3x+4} > 11$

$\ln e^{3x+4} > \ln 11$

$3x + 4 > 2,398$

$-4 \quad -4$

$\frac{3x}{3} > -\frac{1,602}{3}$

$x > -.534$

14. $-4\log_5 x - 5 \geq 3$

$+5 \quad +5$

$\frac{-4\log_5 x}{-4} \geq \frac{8}{-4}$

$\log_5 x \leq -2$

$5^{\log_5 x} \leq 5^{-2}$

$x \leq \frac{1}{5^2}$

$x \leq \frac{1}{25}$

15. You deposit $1000 in an account that pays 3.5% annual interest compounded monthly. When is your balance at least $1200? $3500?

College Algebra – Chapter 7
Lesson 1

Name _____ Date _____

Tell whether x and y show *direct variation, inverse variation, or neither.*

1. $\frac{xy}{x} = \frac{12}{x}$

$y = \frac{12}{x}$ Inverse

2. $4x = y$

Direct

3. $x + y = 6$
$-x \quad -x$

$y = -x + 6$

Neither

4. $\frac{xy}{x} = \frac{\frac{1}{2}}{x}$

$y = \frac{1}{2} \cdot \frac{1}{x} = y = \frac{1}{2x}$

Inverse

5.

x	12	18	23	29	34
y	132	198	253	319	374

xy	1584	3564			
$\frac{y}{x}$	11	11	11	11	11

→ Direct

6.

x	4	5	6.2	7	11
y	16	11	10	9	6

xy	64	55			
$\frac{y}{x}$	4	$\frac{11}{5}$			

Neither

7.

x	1.5	2.5	4	7.5	10
y	13.5	22.5	36	67.5	90

xy	20.25	56.25			
$\frac{y}{x}$	9	9	9	9	9

→ Direct

8.

x	4	6	8	8.4	12
y	21	14	10.5	10	7

xy	84	84	84	84	84
$\frac{y}{x}$	$\frac{21}{4}$	$\frac{14}{6}$			

→ Inverse

College Algebra – Chapter 7

Lesson 1

The variables x and y vary inversely. Use the given values to write an equation relating x and y. Then find y when x = 3.

8. x = 1, y = 9

$y = \frac{a}{x} \Rightarrow 9 = \frac{a}{1} = 9 = a$

$y = \frac{9}{x}$

$y = \frac{9}{3}$

$\Rightarrow 3$

$y = 3$

9. x = 7, y = 2

$y = \frac{a}{x} \Rightarrow (7)2 = \frac{a}{7}(7) \quad 14 = a$

$y = \frac{14}{x}$

$y = \frac{14}{3}$

10. x = -4, $y = -\frac{5}{4}$

$y = \frac{a}{x} \Rightarrow (-4)\frac{5}{4} = \frac{a}{-4}(-4) \quad 5 = a$

$y = \frac{5}{x}$

$y = \frac{5}{3}$

11. $x = \frac{5}{3}$, y = -7

$y = \frac{a}{x} \Rightarrow -7 = \frac{a}{5/3}(5/3) \Rightarrow -\frac{35}{3} = a$

$y = \frac{-35}{3} \Rightarrow y = \frac{-35}{3x}$

$y = \frac{-35}{3(3)} = y = -\frac{35}{9}$

12. The number y of songs that can be stored on an MP3 player varies inversely with the average size x of a song. A certain MP3 player can store 2500 songs when the average size of a song is 4 MB.

a) Make a table showing the number of songs that will fit on the MP3 player when the average size of a song is 2 MB, 2.5 MB, 3 MB, and 5 MB.

x	2	2.5	3	5
y	5000	4000	3333	2000

$(4)2500 = \frac{a}{4}(4) \quad y = \frac{10000}{x}$

$10{,}000 = a$

b) What happens to the number of songs as the average song size increases?

Goes down

College Algebra – Chapter 7
Lesson 2, Day 1

Name _____ Date _____

Graph the function. ~~Compare the graph with the parent function.~~

1. $g(x) = \frac{10}{x}$

Vert: $x=0$
Hori: $y=0$

$f(-3) = \frac{10}{-3}$

$f(-2) = \frac{10}{-2} = -5$

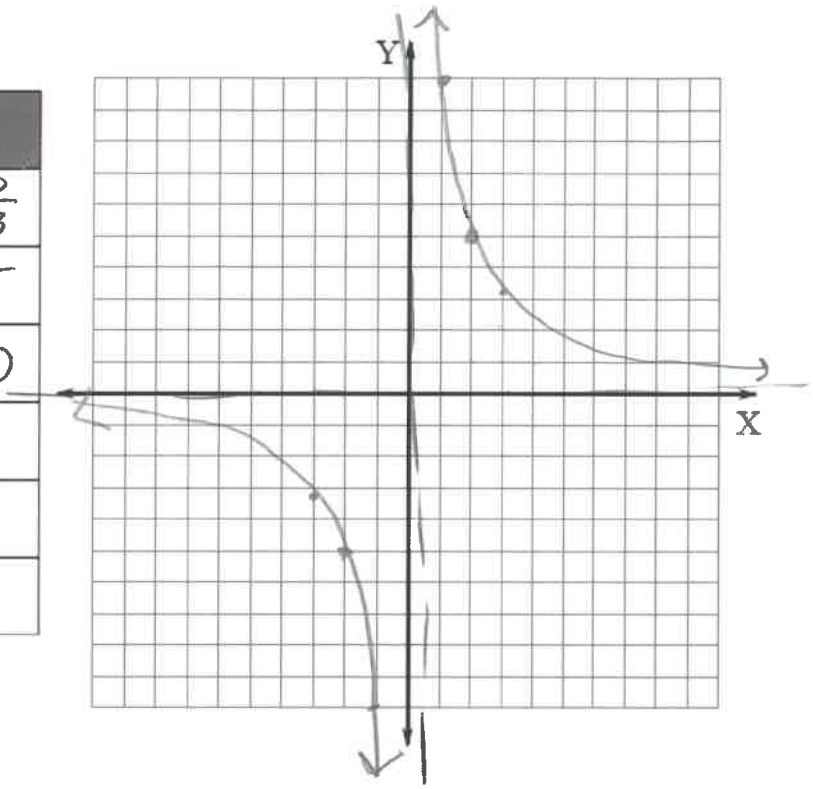
$f(-1) = \frac{10}{-1} = -10$

$f(1) = \frac{10}{1} = 10$

$f(2) = \frac{10}{2} = 5$

$f(3) = \frac{10}{3}$

X	Y
-3	$-\frac{10}{3}$
-2	-5
-1	-10
1	10
2	5
3	$\frac{10}{3}$



2. $g(x) = \frac{-9}{x}$

Vert: $x=0$
Hori: $y=0$

$f(-3) = \frac{-9}{-3} = 3$

$f(-2) = \frac{-9}{-2} = \frac{9}{2}$

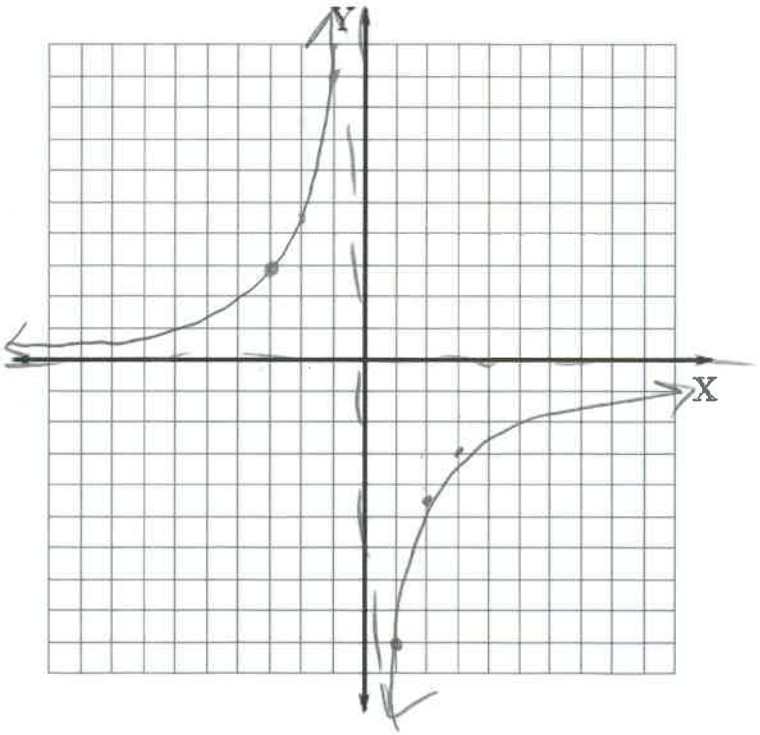
$f(-1) = \frac{-9}{-1} = 9$

$f(1) = \frac{-9}{1} = -9$

$f(2) = \frac{-9}{2} = -\frac{9}{2}$

$f(3) = -\frac{9}{3} = -3$

X	Y
-3	3
-2	$\frac{9}{2}$
-1	9
1	-9
2	$-\frac{9}{2}$
3	-3



College Algebra – Chapter 7

Lesson 2, Day 1

3. $g(x) = \frac{-12}{x}$

Vert: $x=0$ Hori: $y=0$

$f(-3) = \frac{-12}{-3} = 4$

$f(-2) = \frac{-12}{-2} = 6$

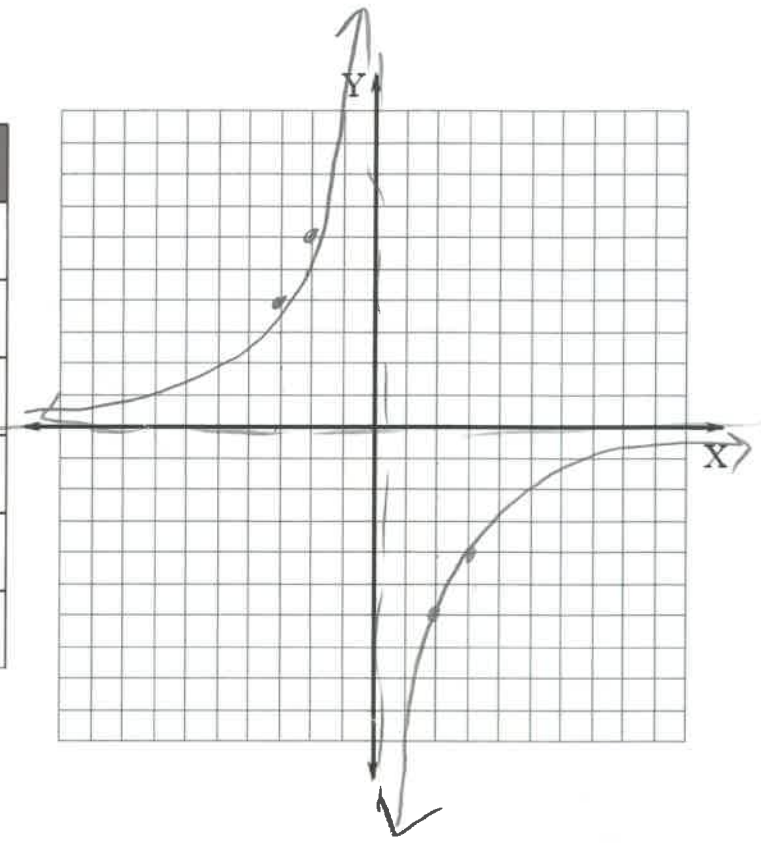
$f(-1) = \frac{-12}{-1} = 12$

$f(1) = \frac{-12}{1} = -12$

$f(2) = \frac{-12}{2} = -6$

$f(3) = \frac{-12}{3} = -4$

X	Y
-3	4
-2	6
-1	12
1	-12
2	-6
3	-4



4. $g(x) = \frac{0.1}{x}$

Vert. $x=0$ Hori. : $y=0$

$f(-3) = \frac{0.1}{-3} = -.03$

$f(-2) = \frac{0.1}{-2} = -.05$

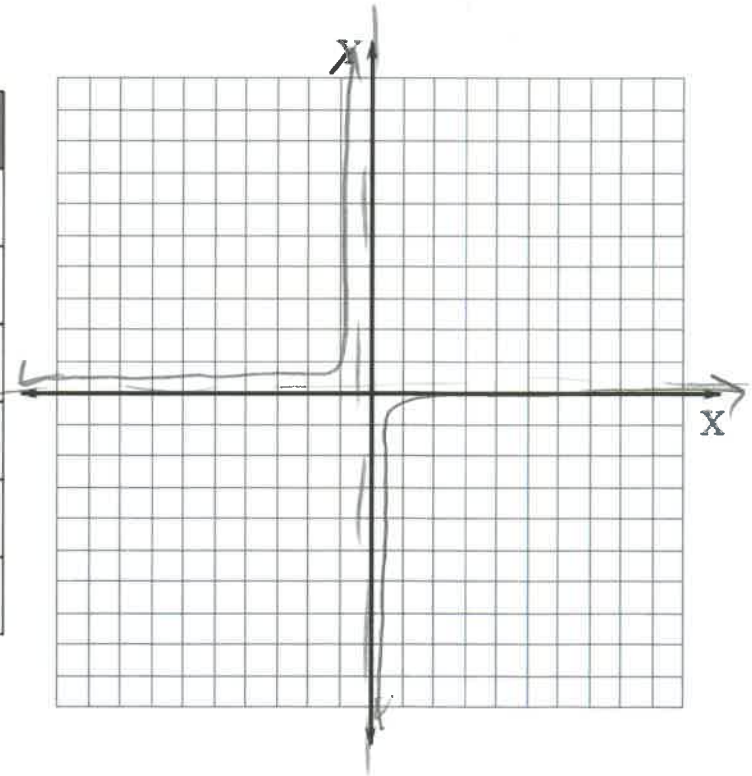
$f(-1) = \frac{0.1}{-1} = -.1$

$f(1) = \frac{0.1}{1} = .1$

$f(2) = \frac{0.1}{2} = .05$

$f(3) = \frac{0.1}{3} = .03$

X	Y
-3	-.03
-2	-.05
-1	-.1
1	.1
2	.05
3	.03



College Algebra – Chapter 7

Lesson 2, Day 1

Graph the function. State the domain and range.

5. $g(x) = \frac{2}{x} - 3$

Vert. $x=0$ Hori: $y=-3$

$f(-3) = \frac{2}{-3} - 3 \Rightarrow -\frac{2}{3} - \frac{9}{3} = -\frac{11}{3}$

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

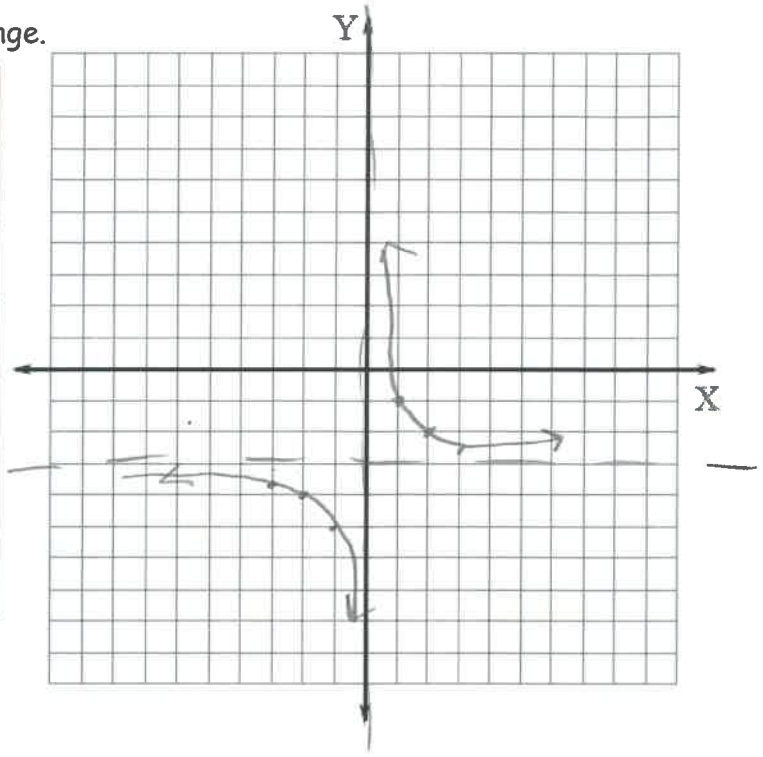
$f(-1) = \frac{2}{-1} - 3 = -2 - 3 = -5$

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

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

$f(3) = \frac{2}{3} - 3 = \frac{2}{3} - \frac{9}{3} = -\frac{7}{3}$

X	Y
-3	$-\frac{11}{3}$
-2	-4
-1	-5
1	-1
2	-2
3	$-\frac{7}{3}$



6. $g(x) = \frac{1}{x+2}$

Vert: $x=-2$ Hori: $y=0$

$f(-5) = \frac{1}{-5+2} = -\frac{1}{3}$

$f(-4) = \frac{1}{-4+2} = -\frac{1}{2}$

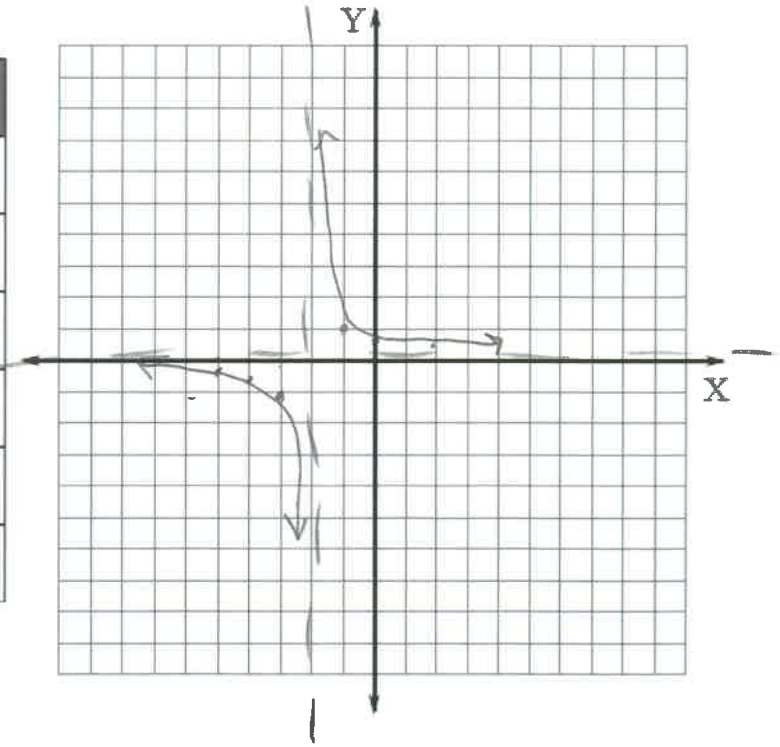
$f(-3) = \frac{1}{-3+2} = \frac{-1}{1} = -1$

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

$f(0) = \frac{1}{0+2} = \frac{1}{2}$

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

X	Y
-5	$-\frac{1}{3}$
-4	$-\frac{1}{2}$
-3	-1
-1	1
0	$\frac{1}{2}$
1	$\frac{1}{3}$



College Algebra – Chapter 7

Lesson 2, Day 1

7. $g(x) = \frac{-2}{x-7}$

Vert: $x=7$ Hori: $y=0$

$f(4) = \frac{-2}{4-7} = \frac{-2}{-3} = \frac{2}{3}$

$f(5) = \frac{-2}{5-7} = \frac{-2}{-2} = 1$

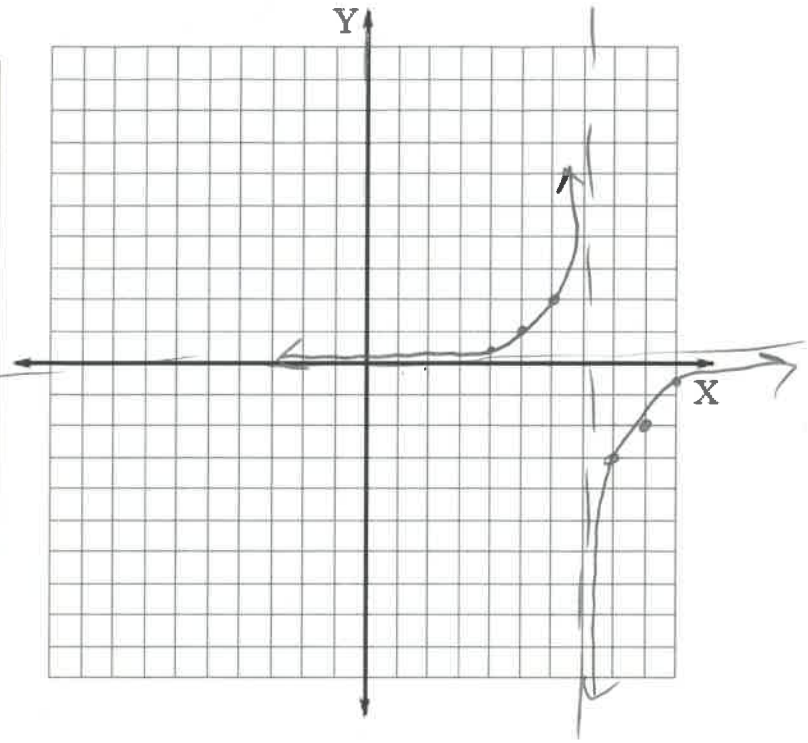
$f(6) = \frac{-2}{6-7} = \frac{-2}{-1} = 2$

$f(8) = \frac{-2}{8-7} = \frac{-2}{1} = -2$

$f(9) = \frac{-2}{9-7} = \frac{-2}{2} = -1$

$f(10) = \frac{-2}{10-7} = \frac{-2}{3}$

X	Y
4	$\frac{2}{3}$
5	1
6	2
8	-2
9	-1
10	$-\frac{2}{3}$



8. $g(x) = \frac{10}{x+7} - 5$

Vert: $x=-7$ Hori: $y=-5$

$f(-10) = \frac{10}{-10+7} - 5 \Rightarrow -\frac{10}{3} - \frac{15}{3}$

$\Rightarrow -\frac{25}{3}$

$f(-9) = \frac{10}{-9+7} - 5 = \frac{10}{-2} - 5 \Rightarrow -5-5$

$\Rightarrow -10$

$f(-8) = \frac{10}{-8+7} - 5 \Rightarrow \frac{10}{-1} \Rightarrow -10-5$

$\Rightarrow -25$

$f(-6) = \frac{10}{-6+7} - 5 = \frac{10}{1} - 5 = 10-5$

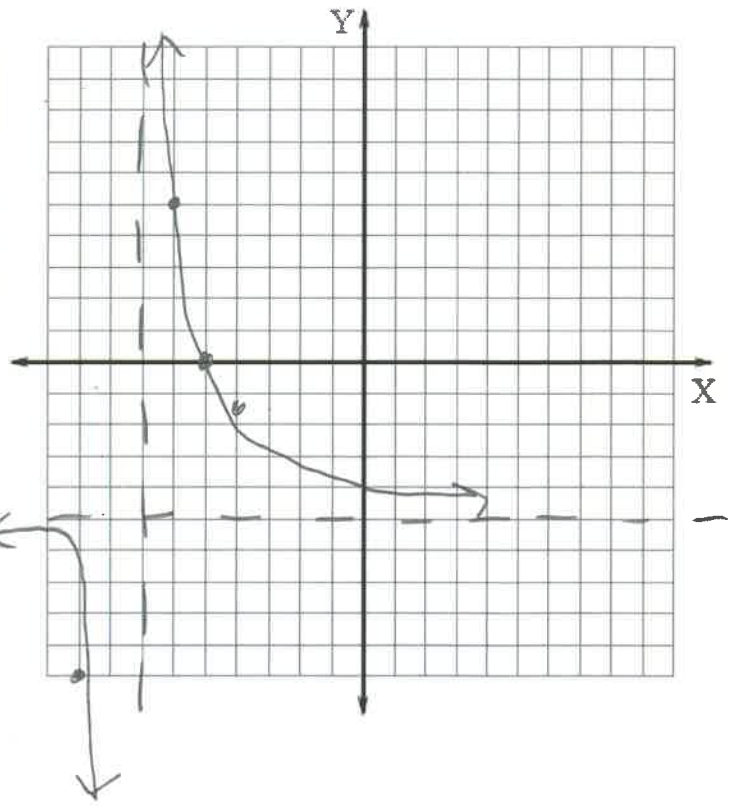
$\Rightarrow 5$

$f(-5) = \frac{10}{-5+7} - 5 \Rightarrow \frac{10}{2} - 5 \Rightarrow$

$5-5=0$

$f(-4) = \frac{10}{-4+7} - 5 = \frac{10}{3} - 5 \Rightarrow \frac{10}{3} - \frac{15}{3} = -\frac{5}{3}$

X	Y
-10	$-\frac{25}{3}$
-9	-10
-8	-25
-6	5
-5	0
-4	$-\frac{5}{3}$



College Algebra – Chapter 7

Lesson 2, Day 1

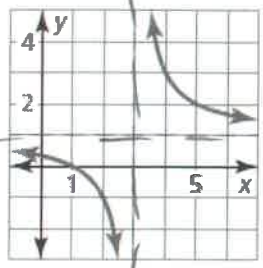
Match the function with its graph. Explain your reasoning.

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

Vert: $x = 3$

Hori: $y = 1$

A.



$x = 3$

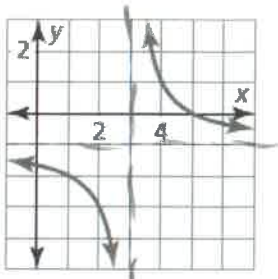
$y = 1$

10. $g(x) = \frac{2}{x-3} - 1$

Vert: $x = 3$

Hori: $y = -1$

B.



$x = 3$

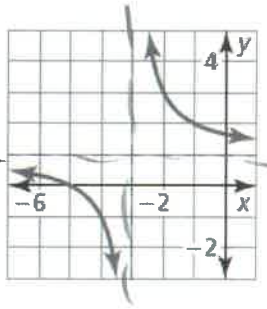
$y = -1$

11. $g(x) = \frac{2}{x+3} + 1$

Vert: $x = -3$

Hori: $y = 1$

C.



$x = -3$

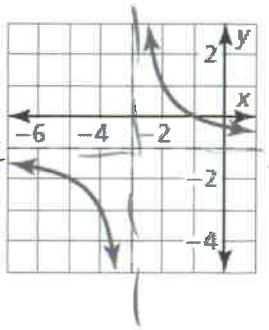
$y = 1$

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

Vert: $x = -3$

Hori: $y = -1$

D.



$x = -3$

$y = -1$

Advanced Algebra – Chapter 7
Lesson 2, Day 2

Name _____ Date _____

Graph the function. State the domain and range.

1. $g(x) = \frac{x-1}{x+5}$

Ver: $x+5=0$
$-5 \quad -5$
$x=-5$

Horizontal: $\frac{1}{1}=1$

$f(-2) = \frac{-2-1}{-2+5} = \frac{-3}{3} = -1$

$f(-3) = \frac{-3-1}{-3+5} = \frac{-4}{2} = -2$

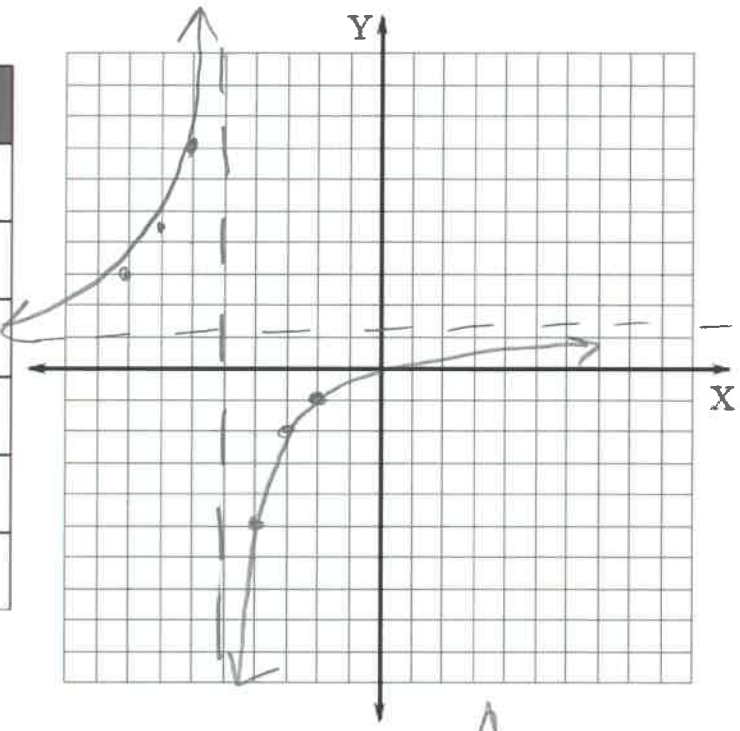
$f(-4) = \frac{-4-1}{-4+5} = \frac{-5}{1} = -5$

$f(-6) = \frac{-6-1}{-6+5} = \frac{-7}{-1} = 7$

$f(-7) = \frac{-7-1}{-7+5} = \frac{-9}{-2} = \frac{9}{2}$

$f(-8) = \frac{-8-1}{-8+5} = \frac{-9}{-3} = 3$

X	Y
-2	-1
-3	-2
-4	-5
-6	7
-7	$\frac{9}{2}$
-8	3



2. $g(x) = \frac{8x+3}{2x-6}$

Ver: $2x-6=0$
$+6 \quad +6$
$\frac{2x}{2} = \frac{6}{2}$
$x=3$

Hor: $\frac{8}{2}=4$

$f(0) = \frac{8(0)+3}{2(0)-6} = \frac{3}{-6} = -\frac{1}{3}$

$f(1) = \frac{8(1)+3}{2(1)-6} = \frac{8+3}{2-6} = \frac{11}{-4}$

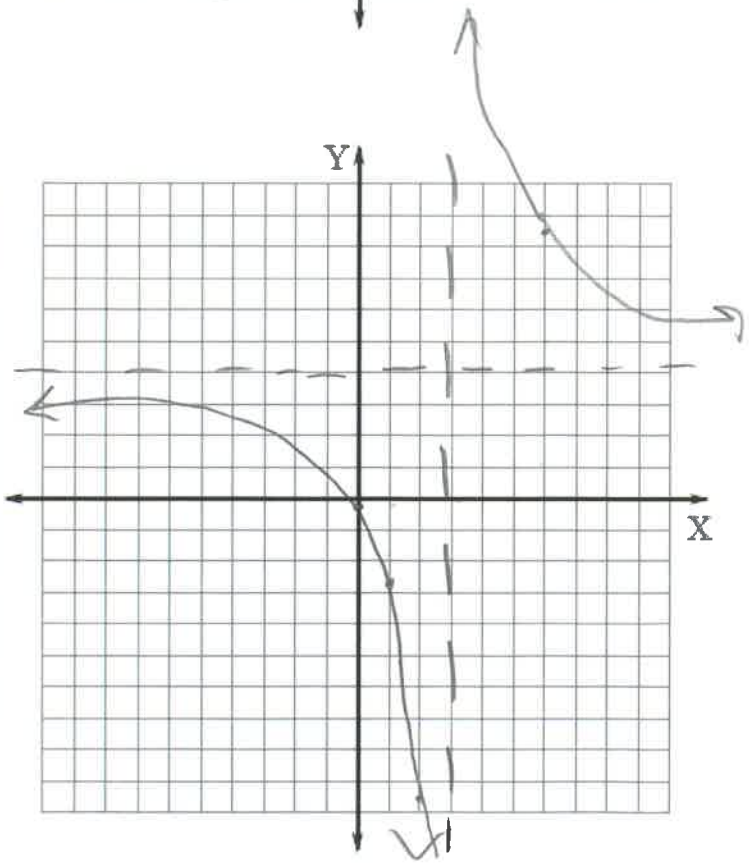
$f(2) = \frac{8(2)+3}{2(2)-6} = \frac{16+3}{4-6} = \frac{19}{-2}$

$f(4) = \frac{8(4)+6}{2(4)-6} = \frac{32+6}{8-6} = \frac{38}{2} = -19$

$f(5) = \frac{8(5)+6}{2(5)-6} = \frac{40+6}{10-6} = \frac{46}{4} = \frac{23}{2}$

$f(6) = \frac{8(6)+2}{2(6)-6} = \frac{48+2}{12-6} = \frac{50}{6} = \frac{25}{3}$

X	Y
0	$-\frac{1}{3}$
1	$-\frac{11}{4}$
2	$-\frac{19}{2}$
4	19
5	$\frac{23}{2}$
6	$\frac{25}{3}$



Advanced Algebra – Chapter 7

Lesson 2, Day 2

3. $g(x) = \frac{6x-1}{3x-1}$

Vert: $3x-1=0$, $+1\ +1$, $\frac{3x}{3} = \frac{1}{3}$, $x = \frac{1}{3}$

Hori: $\frac{6}{3} = 2$

$f(-2) = \frac{6(-2)-1}{3(-2)-1} = \frac{-12-1}{-6-1} = \frac{-13}{7}$

$f(-1) = \frac{6(-1)-1}{3(-1)-1} = \frac{-6-1}{-3-1} = \frac{-7}{-4} = \frac{7}{4}$

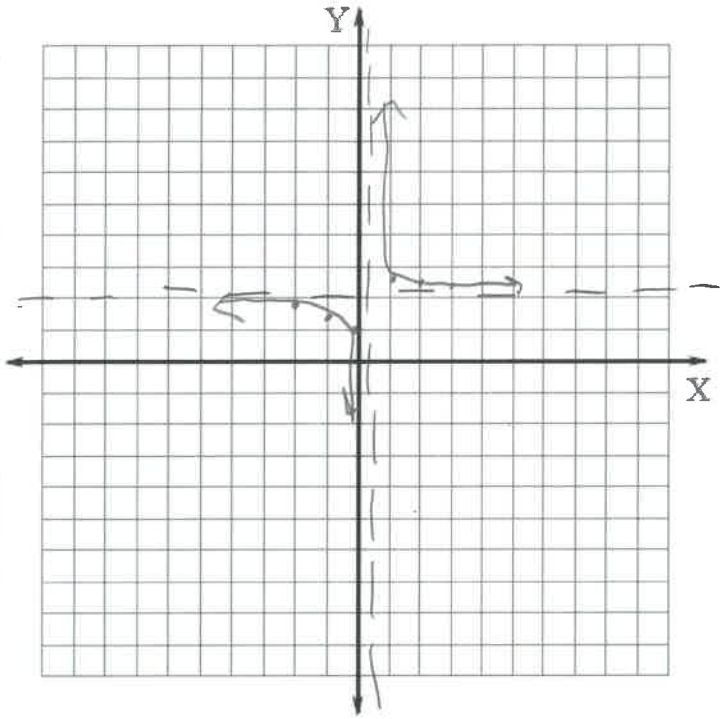
$f(0) = \frac{6(0)-1}{3(0)-1} = \frac{-1}{-1} = 1$

$f(1) = \frac{6(1)-1}{3(1)-1} = \frac{6-1}{3-1} = \frac{5}{2}$

$f(2) = \frac{6(2)-1}{3(2)-1} = \frac{12-1}{6-1} = \frac{11}{5}$

$f(3) = \frac{6(3)-1}{3(3)-1} = \frac{18-1}{9-1} = \frac{17}{8}$

X	Y
-2	$\frac{13}{7}$
-1	$\frac{7}{4}$
0	1
1	$\frac{5}{2}$
2	$\frac{11}{5}$
3	$\frac{17}{8}$



4. $g(x) = \frac{-2x+3}{-x+10}$

Vert: $-x+10=0$, $-10\ -10$, $-x = -10$, $x = 10$

Hori: $\frac{-2}{-1} = 2$

$f(7) = \frac{-2(7)+3}{-7+10} = \frac{-14+3}{3} = \frac{-11}{3}$

$f(8) = \frac{-2(8)+3}{-8+10} = \frac{-16+3}{2} = \frac{-13}{2}$

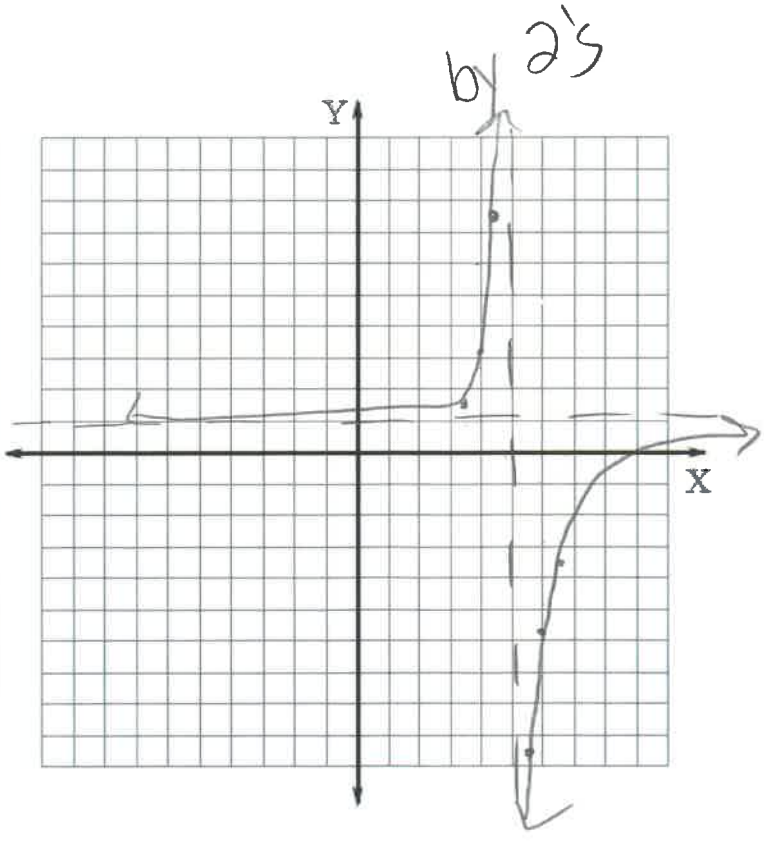
$f(9) = \frac{-2(9)+3}{-9+10} = \frac{-18+3}{1} = -15$

$f(11) = \frac{-2(11)+3}{-11+10} = \frac{-22+3}{-1} = \frac{-19}{-1} = 19$

$f(12) = \frac{-2(12)+3}{-12+10} = \frac{-24+3}{-2} = \frac{-21}{-2} = \frac{21}{2}$

$f(13) = \frac{-2(13)+3}{-13+10} = \frac{-26+3}{-3} = \frac{-23}{-3} = \frac{23}{3}$

X	Y
7	$\frac{-11}{3}$
8	$\frac{-13}{2}$
9	-15
11	19
12	$\frac{21}{2}$
13	$\frac{23}{3}$



College Algebra – Chapter 7
Lesson 3, Day 1

Name _____ Date _____

Simplify the expression, if possible.

1. $\frac{7x^3-x^2}{2x^3}$

$\frac{x^2(7x-1)}{2x^3} \Rightarrow \boxed{\frac{7x-1}{2x}}$

2. $\frac{x^2+13x+36}{x^2-7x+10}$

$\frac{(x+9)(x+4)}{(x-5)(x-2)}$

3. $\frac{x^2-7x+12}{x^3-27}$

$\frac{(x-4)(x-3)}{(x-3)(x^2+3x+9)}$

$\frac{x-4}{x^2+3x+9}$

4. $\frac{3x^3-3x^2+7x-7}{27x^4-147}$

$\frac{3x^2(x-1)+7(x-1)}{3(9x^4-49)} \Rightarrow \frac{(3x^2+7)(x-1)}{3(3x^2-7)(3x^2+7)}$

$\boxed{\frac{x-1}{3(3x^2-7)}}$

Find the product.

5. $\frac{48x^5y^3}{y^4} \cdot \frac{x^2y}{6x^3y^2}$

$\frac{8 \cdot 6 x^{5+2} y^{3+1}}{6 x^3 y^2} \Rightarrow \frac{8x^4}{y^2}$

6. $\frac{x^3(x+5)}{x-9} \cdot \frac{(x-3)(x+6)}{x^3}$

$\frac{(x+5)(x-3)(x+6)}{(x-9)}$

College Algebra – Chapter 7

Lesson 3, Day 1

7. $\frac{x^2-4x}{x-1} \cdot \frac{x^2+3x-4}{2x}$

$\frac{x(x-4)}{x-1} \cdot \frac{(x+4)(x-1)}{2x}$

$\frac{x(x-4)(x+4)(x-1)}{2x(x-1)}$

$\frac{(x-4)(x+4)}{2}$

8. $\frac{x^2-x-6}{4x^3} \cdot \frac{2x^2+2x}{x^2+5x+6}$

$\frac{(x-3)(x+2)}{4x^3} \cdot \frac{2x(x+1)}{(x+2)(x+3)}$

$\frac{2x(x-3)(x+2)(x+1)}{4x^3(x+2)(x+3)}$

$\frac{(x-3)(x+1)}{2x^2(x+3)}$

9. $\frac{x^2-x-12}{x^2-16} \cdot (x^2+2x-8)$

$\frac{(x-4)(x+3)}{(x-4)(x+4)} \cdot \frac{(x+4)(x-2)}{1}$

$(x+3)(x-2)$

10. Describe and correct the error in simplifying the rational expression.

$$\frac{x^2+16x+46}{x^2+8x+16} = \frac{x^2+2x+3}{x^2+x+1}$$

(cannot simplify until factored)

$\frac{(x+12)(x+4)}{(x+4)(x+4)}$

$\frac{(x+12)}{(x+4)}$

11. Describe and correct the error in finding the product.

$$\frac{x^2-25}{3-x} \cdot \frac{x-3}{x+5} = \frac{(x+5)(x-5)}{3-x} \cdot \frac{x-3}{x+5}$$

$$= \frac{(x+5)(x-5)(x-3)}{(3-x)(x+5)}$$

$x \neq 5, x \neq 3, x \neq -5$

cannot cancel $3-x$ & $x-3$ unless you factor out a -1

$\frac{(x+5)(x-5)(x-3)}{-1(x-3)(x+5)}$

$\frac{x-5}{-1} = -x+5$

College Algebra – Chapter 7
Lesson 3, Day 2

Name _____ Date _____

Simplify the expression, if possible.

1. Which rational expression is in simplified form?

Ⓐ $\frac{x^2 - x - 6}{x^2 + 3x + 2}$ $\frac{(x-3)(x+2)}{(x+2)(x+1)}$

Ⓑ $\frac{x^2 + 6x + 8}{x^2 + 2x - 3}$ $\frac{(x+4)(x+2)}{(x+3)(x-1)}$

Ⓒ $\frac{x^2 - 6x + 9}{x^2 - 2x - 3}$ $\frac{(x-3)(x-3)}{(x-3)(x+1)}$

Ⓓ $\frac{x^2 + 3x - 4}{x^2 + x - 2}$ $\frac{(x+4)(x-1)}{(x+2)(x-1)}$

Find the quotient.

2. $\frac{2xyz}{x^3z^3} \div \frac{6y^4}{2x^2z^2}$

$\frac{2xyz}{x^3z^3} \cdot \frac{2x^2z^2}{6y^4} \Rightarrow \frac{4x^3yz^3}{6x^3y^4z^3}$

$\frac{2}{3y^3}$

3. $\frac{2x^2-12x}{x^2-7x+6} \div \frac{2x}{3x-3}$

$\frac{2x(x-6)}{(x-6)(x-1)} \cdot \frac{3(x-1)}{2x}$

3

4. $\frac{x^2-5x-36}{x+2} \div (x^2 - 6x + 9)$

$\frac{(x-9)(x+4)}{x+2} \cdot \frac{1}{(x-3)(x-3)}$

$\frac{(x-9)(x+4)}{(x+2)(x-3)(x-3)}$

5. $\frac{x^2-3x-40}{x^2+8x-20} \div \frac{x^2+13x+40}{x^2+12x+20}$

$\frac{(x-8)(x+5)}{(x+10)(x-2)} \cdot \frac{(x+10)(x+2)}{(x+8)(x+5)}$

$\frac{(x-8)(x+2)}{(x-2)(x+8)}$

College Algebra – Chapter 7
Lesson 4, Day 1

Name _____ Date _____

Find the sum or difference.

1. $\frac{x}{16x^2} - \frac{4}{16x^2}$

$\frac{(x-4)}{16x^2}$

2. $\frac{4x^2}{2x-1} - \frac{1}{2x-1}$

$\frac{4x^2-1}{2x-1} \Rightarrow \frac{(2x-1)(2x+1)}{2x-1}$

$(2x+1)$

Find the least common multiple of the expressions.

3. $2x^2$; $4x + 12$

$2x^2$

$4x+12 \rightarrow 4(x+3)$

LCD: $4x^2(x+3)$

4. $24x^2$; $8x^2 - 16x$

$24x^2$

$8x^2-16x \rightarrow 8x(x-2)$

LCD: $24x^2(x-2)$

5. $9x^2 - 16$; $3x^2 + x - 4$

$9x^2-16 \rightarrow (3x-4)(3x+4)$

$3x^2+x-4 \rightarrow (3x+4)(x-1)$

LCD: $(3x-4)(3x+4)(x-1)$

6. $x^2 - 2x - 63$; $x + 7$

$x^2-2x-63 \rightarrow (x-9)(x+7)$

$x+7$

LCD: $(x-9)(x+7)$

Find the sum or difference.

7. $\frac{8}{3x^2} + \frac{5}{4x}$ LCD: $12x^2$

$\frac{8}{3x^2}\frac{(4)}{(4)} + \frac{5(3x)}{4x(3x)} \Rightarrow \frac{32}{12x^2} + \frac{15x}{12x^2}$

$\frac{15x+32}{12x^2}$

8. $\frac{9}{x-3} + \frac{2x}{x+1}$ LCD: $(x-3)(x+1)$

$\frac{9(x+1)}{(x-3)(x+1)} + \frac{2x(x-3)}{(x+1)(x-3)}$

$\frac{9x+1}{(x-3)(x+1)} + \frac{2x^2-6x}{(x+1)(x-3)} \Rightarrow \frac{2x^2+3x+1}{(x+1)(x-3)}$

$\frac{(2x+1)(x+1)}{(x+1)(x-3)} = \frac{2x+1}{x-3}$

College Algebra – Chapter 7

Lesson 4, Day 1

9. $\frac{x^2-5}{x^2+5x-14} - \frac{x+3}{x+7}$ LCD: $(x+7)(x-2)$

$x^2+5x-14 \rightarrow (x+7)(x-2)$

$x+7$

$\frac{x^2-5}{(x+7)(x-2)} - \frac{(x+3)(x-2)}{(x+7)(x-2)} \Rightarrow \frac{x^2-5}{\sim} - \frac{x^2+3x-2x-6}{\sim}$

$\frac{x^2-5}{\sim} - \frac{x^2+x-6}{\sim} \Rightarrow \frac{x^2-5-x^2-x+6}{\sim} \Rightarrow \boxed{\frac{-x+1}{(x+7)(x-2)}}$

10. $\frac{x+3}{x^2-25} - \frac{x-1}{x-5} + \frac{3}{x+3}$ LCD: $(x-5)(x+5)(x+3)$

$x^2-5 \rightarrow (x-5)(x+5)$

$\frac{x+3}{x-5)(x+5)(x+3)} (x+3) - \frac{(x-1)(x+5)(x+3)}{(x-5)(x+5)(x+3)} + \frac{3}{(x+5)(x-5)(x+5)}(x-5)(x+5)$

$\frac{x^2+6x+9}{\sim} - \frac{(x-1)(x^2+8x+15)}{\sim} + \frac{3(x^2-25)}{\sim}$

$\frac{x^2+6x+9}{\sim} - \frac{x^3+8x^2+15x-x^2-8x-15}{\sim} + \frac{3x^2-75}{\sim}$

$x^2+6x+9-x^3-8x^2-15x+x^2+8x+15+3x^2-75$

$\boxed{\frac{-x^3-3x^2-x-51}{(x+5)(x-5)(x+3)}}$

Tell whether the statement is *always*, *sometimes*, or *never* true. Explain your reasoning.

11. The LCD of two rational expressions is the product of the denominators.

Sometimes

$2x + 4x \rightarrow$ product is $8x^2$

$\rightarrow$ LCD: $4x$

12. The LCD of two rational expressions will have a degree greater than or equal to that of the denominator with the higher degree.

Always

Advanced Algebra – Chapter 7
Lesson 4, Day 2

Name _____ Date _____

1. How would you begin to rewrite the function $g(x) = \frac{4x+1}{x+2}$ to obtain the form $g(x) = \frac{a}{x-h} + k$?

(A) $g(x) = \frac{4(x+2)-7}{x+2}$ (B) $g(x) = \frac{4(x+2)+1}{x+2}$

(C) $g(x) = \frac{(x+2)+(3x-1)}{x+2}$ (D) $g(x) = \frac{4x+2-1}{x+2}$

Rewrite the function g in the form $g(x) = \frac{a}{x-h} + k$. Describe the graph as a transformation of the graph of the parent function.

2. $g(x) = \frac{6x+4}{x+5}$

$\frac{6(x+5)-26}{x+5} \Rightarrow \frac{6(x+5)}{x+5} - \frac{26}{x+5}$

$-\frac{26}{x+5} + 6$

5 units left
6 units up
Reflection x-axis

3. $g(x) = \frac{8x}{x+13}$

$\frac{8(x+13)-104}{(x+13)} \Rightarrow \frac{8(x+13)}{(x+13)} - \frac{104}{(x+13)}$

$-\frac{104}{(x+13)} + 8$

Trans 13 units left
Trans 8 units up
Reflect x-axis

4. $g(x) = \frac{4x-6}{x}$

$\frac{4x}{x} - \frac{6}{x}$

$-\frac{6}{x} + 4$

4 up
Reflect x-axis

5. $g(x) = \frac{7x-9}{x+10}$

$\frac{7(x+10)-79}{x+10} \Rightarrow \frac{7(x+10)}{(x+10)} - \frac{79}{(x+10)}$

$-\frac{79}{x+10} + 7$

10 units left
7 units up
Reflect x-axis

Advanced Algebra – Chapter 7

Lesson 4, Day 2

Simplify the complex fraction.

6. $\dfrac{\frac{1}{2x-5}-\frac{7}{8x-20}}{\frac{x}{2x-5}}$

Num: $\frac{1}{2x-5}-\frac{7}{8x-20}$ LCD: $4(2x-5)$

$8x-20 \rightarrow 4(2x-5)$

$\frac{1(4)}{2x-5(4)}-\frac{7}{4(2x-5)} \Rightarrow \frac{4}{4(2x-5)}-\frac{7}{4(2x-5)}$

$\Rightarrow \frac{-3}{4(2x-5)}$

Denom: $\frac{x}{2x-5}$

$\frac{-3}{4(2x-5)} \div \frac{x}{2x-5} \Rightarrow \frac{-3}{4(2x-5)} \cdot \frac{2x-5}{x}$

$\frac{-3(2x-5)}{4x(2x-5)} = \boxed{\frac{-3}{4x}}$

7. $\dfrac{15-\frac{2}{x}}{\frac{x}{5}+4}$

Num: $\frac{15}{1}-\frac{2}{x}$ LCD: x

$\frac{15(x)}{1(x)}-\frac{2}{x} \Rightarrow \frac{15x}{x}-\frac{2}{x}=\frac{15x-2}{x}$

Denom: $\frac{x}{5}+\frac{4}{1}$ LCD: 5

$\frac{x}{5}+\frac{4(5)}{1(5)} \Rightarrow \frac{x}{5}+\frac{20}{5}=\frac{x+20}{5}$

$\frac{15x-2}{x} \div \frac{x+20}{5} \Rightarrow \frac{15x-2}{x} \cdot \frac{5}{x+20}$

$\boxed{\frac{5(15x-2)}{x(x+20)}}$

8. $\dfrac{\frac{16}{x-2}}{\frac{4}{x+1}+\frac{6}{x}}$

Num: $\frac{16}{x-2}$

Denom $\frac{4}{x+1}+\frac{6}{x}$ LCD: $x(x+1)$

$\frac{4(x)}{x+1(x)}+\frac{6(x+1)}{x(x+1)} \Rightarrow \frac{4x}{x(x+1)}+\frac{6x+6}{x(x+1)}$

$\frac{10x+6}{x(x+1)}$

$\frac{16}{x-2} \div \frac{10x+6}{x(x+1)} \Rightarrow \frac{16}{x-2} \cdot \frac{x(x+1)}{2(5x+3)}$

$\frac{8\,16x(x+1)}{2(x-2)(5x+3)} = \boxed{\frac{8x(x+1)}{(x-2)(5x+3)}}$

9. $\dfrac{\frac{3}{x-2}-\frac{6}{x^2-4}}{\frac{3}{x+2}+\frac{1}{x-2}}$

Num: $\frac{3}{x-2}-\frac{6}{(x-2)(x+2)}$ LCD: $(x-2)(x+2)$

$\frac{3(x+2)}{(x-2)(x+2)}-\frac{6}{(x-2)(x+2)} \Rightarrow \frac{3x+6}{(x-2)(x+2)}-\frac{6}{(x-2)(x+2)}$

$\frac{3x}{(x-2)(x+2)}$

Denom: $\frac{3}{x+2}+\frac{1}{(x-2)}$ LCD: $(x+2)(x-2)$

$\frac{3(x-2)}{x+2(x-2)}+\frac{1(x+2)}{(x-2)(x+2)} \Rightarrow \frac{3x-6}{(x+2)(x-2)}+\frac{x+2}{(x+2)(x-2)}$

$\frac{3x-6+x+2}{(x+2)(x-2)} \Rightarrow \frac{4x-4}{(x+2)(x-2)}$

$\frac{3x}{(x+2)(x-2)} \div \frac{4x-4}{(x+2)(x-2)} \Rightarrow \frac{3x}{(x+2)(x-2)} \cdot \frac{(x+2)(x-2)}{4(x-1)}$

$\frac{3x(x+2)(x-2)}{4(x-1)(x+2)(x-2)} = \boxed{\frac{3x}{4(x-1)}}$

College Algebra – Chapter 7
Lesson 5

Name _____ Date _____

Solve the equation by cross multiplying. Check your solution(s).

1. $\frac{9}{3x} = \frac{4}{x+2}$

$9(x+2) = 4(3x)$
$9x+18 = 12x$
$-9x \quad -9x$
$\frac{18}{3} = \frac{3x}{3}$
$6 = x$

2. $\frac{8}{3x-2} = \frac{2}{x-1}$

$8(x-1) = 2(3x-2)$
$8x-8 = 6x-4$
$-6x+8 \quad -6x+8$
$\frac{2x}{2} = \frac{4}{2}$
$x = 2$

3. $\frac{-2}{x-1} = \frac{x-8}{x+1}$

$-2(x+1) = (x-1)(x-8)$
$-2x-2 = x^2-9x+8$
$-x^2+9x-8 \quad -x^2+9x-8$
$-x^2+7x-10 = 0$
$x^2-7x+10 = 0$
$(x-5)(x-2) = 0$
$x = 5$ $x = 2$

4. $\frac{-1}{x-3} = \frac{x-4}{x^2-27}$

$-1(x^2-27) = (x-3)(x-4)$
$-x^2+27 = x^2-7x+12$
$-x^2+7x-12 \quad -x^2+7x-12$
$-2x^2+7x+15 = 0$
$2x^2-7x-15 = 0$
$(2x+3)(x-5) = 0$
$2x+3=0$ $x-5=0$
$x = -\frac{3}{2}$ $x = 5$

5. So far in volleyball practice, you have put into play 37 of the 44 serves you have attempted. Solve the equation $\frac{90}{100} = \frac{37+x}{44+x}$ to find the number of consecutive serves you need ot put into play in order to raise your serve percentage to 90%.

$90(44+x) = 100(37+x)$
$3960+90x = 3700+100x$
$-3960 \quad -100x \quad -3960 \quad -100x$
$\frac{-10x}{-10} = \frac{-260}{-10}$
$x = 26$

at least 26 more serves

College Algebra – Chapter 7

Lesson 5

Identify the least common denominator of the equation.

6. $\frac{x}{x+3}+\frac{1}{3}=\frac{3}{x}$

LCD: $3x(x+3)$

7. $\frac{4}{x+9}+\frac{3x}{2x-1}=\frac{10}{3}$

LCD: $3(x+9)(2x-1)$

Solve the equation using the LCD. Check your solution(s).

8. $\frac{2}{3x}+\frac{1}{6}=\frac{4}{3x}$ LCD: $(6x)$

$\frac{2}{3x}[6x]+\frac{1}{6}[6x]=\frac{4}{3x}[6x]$

$4+x=8$

$-4 \quad -4$

$x=4$

9. $\frac{2}{x-3}+\frac{1}{x}=\frac{x-1}{x-3}$ LCD: $x(x-3)$

$\frac{2}{x-3}[x(x-3)]+\frac{1}{x}[x(x-3)]=\frac{x-1}{x-3}[x(x-3)]$

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

$3x-3=x^2-x$

$-x^2 \quad +x$

$-x^2+4x-3=0$

$x^2-4x+3=0$

$(x-3)(x-1)=0$

$x=3$ $x=1$

→ Can't have 0 in denom.

10. $\frac{10}{x}+3=\frac{x+9}{x-4}$ LCD: $x(x-4)$

$\frac{10}{x}[x(x-4)]+3[x(x-4)]=\frac{x+9}{x-4}[x(x-4)]$

$10(x-4)+3x(x-4)=x(x+9)$

$10x-40+3x^2-12x=x^2+9x$

$3x^2-2x-40=x^2+9x$

$-x^2 \quad -9x \quad -x^2 \quad -9x$

$2x^2-11x-40=0$

$(2x+5)(x-8)=0$

$2x+5=0$ $\quad x-8=0$

$-5 \quad -5$ $\quad x=8$

$\frac{2x}{2}=\frac{-5}{2}$

$x=-5/2$

11. $\frac{10}{x^2-2x}+\frac{4}{x}=\frac{5}{x-2}$ LCD: $x(x-2)$

$x(x-2)$

$\frac{10}{x(x-2)}[x(x-2)]+\frac{4}{x}[x(x-2)]=\frac{5}{x-2}[x(x-2)]$

$10+4(x-2)=5x$

$10+4x-8=5x$

$4x+2=5x$

$-4x \quad -4x$

$2 \neq x$

Cannot have 0 in denom.

College Algebra – Chapter 7

Lesson 5

The functions below all have inverses. Find the inverse of the function.

12. $f(x) = \frac{7}{x+6}$

$(y+6)X = \frac{7}{y+6}(y+6)$

$\frac{X(y+6)}{X} = \frac{7}{X}$

$y+6 = \frac{7}{X}$

$-6 \quad -6$

$y = \frac{7}{x} - 6$

13. $f(x) = \frac{5}{x} - 6$

$X = \frac{5}{y} - 6$

$+6 \quad +6$

$X(X+6) = \frac{5}{y}(y)$

$\frac{y(x+6)}{(x+6)} = \frac{5}{(x+6)}$

$y = \frac{5}{x+6}$

14. $f(x) = \frac{8}{9+5x}$

$(9+5y)X = \frac{8}{9+5y}(9+5y)$

$\frac{X(9+5y)}{X} = \frac{8}{X}$

$9+5y = \frac{8}{X} - 9$

-9

$\frac{5y}{5} = \frac{\frac{8}{X} - 9}{5}$

$y = \frac{\frac{8}{x}}{5} - \frac{9}{5}$

$y = \frac{8}{x}(\frac{1}{5}) - \frac{9}{5}$

$y = \frac{8}{5x} - \frac{9}{5}$

15. $f(x) = \frac{1}{x^4} - 7$

$X = \frac{1}{y^4} - 7$

$+7 \quad +7$

$(y^4)X+7 = \frac{1}{y^4}(y^4)$

$\frac{y^4(x+7)}{(x+7)} = \frac{1}{x+7}$

$\sqrt[4]{y^4} = \sqrt[4]{\frac{1}{x+7}}$

$y = \sqrt[4]{\frac{1}{x+7}}$