2-4 HW Answer Key

1. $\frac{16x-9}{4(3x+1)}, x \neq -1/3$

2. $\frac{-1}{x-4}, x \neq \pm 4$

3. 7

4. $-\frac{6}{5}$

5. -3

6. $\frac{4}{5}$

7. -1

8. 6

9. -3

10. -1 and 4

Alg 2 Homework 2-4 Name Key (2016)

Add or subtract. Identify any x-values for when the expression is undefined.

1. $\frac{4x-5}{12x+4}+\frac{3x-1}{3x+1}$

$\frac{4x-5}{4(3x+1)}+\frac{3x-1}{3x+1}\left(\frac{4}{4}\right)$

$\frac{4x-5}{4(3x+1)}+\frac{12x-4}{4(3x+1)}$

$\boxed{\frac{16x-9}{4(3x+1)}}$ $x \neq -1/3$

2. $\frac{2x+8}{x^2-16}-\frac{3}{x-4}$ $x \neq \pm 4$

$\frac{2x+8}{(x+4)(x-4)}-\frac{3}{x-4}\left(\frac{x+4}{x+4}\right)$

$\frac{2x+8}{(x+4)(x-4)}-\frac{3x+12}{(x-4)(x+4)}$

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

Solve and check for extraneous roots:

3. $\frac{x+3}{12}=\frac{5}{6}$

$6x+18=60$

$6x=42$

$x=7$

$\{7\}$

4. $\frac{3}{x}=\frac{8}{x-2}$ $x \neq 0, 2$

$3(x-2)=8x$

$3x-6=8x$

$-6=5x$

$-6/5=x$

$\{-6/5\}$

$\left(\frac{\cancel{x-3}}{1}\right)\frac{x^2-1}{\cancel{x-3}} = \frac{8}{\cancel{x-3}}\left(\frac{\cancel{x-3}}{1}\right)$ $x \neq 3$

$x^2-1=8$

$x^2-9=0$

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

$x+3=0$ | $x-3=0$

$x=-3$ | $\cancel{x=3}$ reject

$\{-3\}$

$(x^2-1)(x-3) = 8(x-3)$

$x^3-3x^2-x+3 = 8x-24$

$x^3-3x^2-9x+27=0$

$x^2(x-3)-9(x-3)=0$

$(x-3)(x^2-9)=0$

$x=3$ $x=\pm 3$

$x, 4, 3 = 12x$

6. $12x\left(\frac{6}{3x}+\frac{5}{4}\right)=\left(\frac{3}{x}\right)12x$ $x \neq 0$

$\left(\frac{12x}{1}\right)\frac{6}{3x}+\left(\frac{12x}{1}\right)\frac{5}{4} = \left(\frac{12x}{1}\right)\left(\frac{3}{x}\right)$

$24+15x=36$

$15x=12$

$x=12/15=4/5$

$\{4/5\}$

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7. $\frac{x+3}{3x+6}+\frac{4}{x+2}=\frac{14}{3}$ $x \neq -2$

$\frac{3(x+2)}{1}\left(\frac{x+3}{\cancel{3(x+2)}}\right)+\frac{3\cancel{(x+2)}}{1}\left(\frac{4}{\cancel{x+2}}\right)=\frac{14}{\cancel{3}}\left(\frac{\cancel{3}(x+2)}{1}\right)$

$x+3+12=14(x+2)$

$x+15=14x+28$

$-13=13x$

$-1=x$

$\{-1\}$

$2, x, 3 = 6x$

8. $\frac{1}{2}+\frac{2}{x}=\frac{3}{x}+\frac{1}{3}$ $x \neq 0$

$\left(\frac{6x}{1}\right)\frac{1}{2}+\left(\frac{6x}{1}\right)\frac{2}{x}=\left(\frac{6x}{1}\right)\frac{3}{x}+\left(\frac{6x}{1}\right)\frac{1}{3}$

$3x+12=18+2x$

$x=6$

$\{6\}$

9. $\frac{x}{x-2}+\frac{x}{\underset{(x+2)(x-2)}{x^2-4}}=\frac{x+3}{x+2}$ $x\neq\pm2$ 10. $\frac{12}{x-1}-\frac{8}{x}=2$

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

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

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

$3x=x-6$

$2x=-6$

$x=-3$ $\{-3\}$

10. $\frac{12}{\cancel{x-1}}\left(\frac{\cancel{(x-1)}(x)}{1}\right)-\frac{8}{\cancel{x}}\left(\frac{\cancel{x}(x-1)}{1}\right)=\frac{2}{1}\left(\frac{x(x-1)}{1}\right)$ $x\neq0,1$

$12x-8(x-1)=2x(x-1)$

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

$0=2x^2-6x-8$

$0=x^2-3x-4$ $\{-1,4\}$

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

$x-4=0$	$x+1=0$
$x=4$	$x=-1$

Rational Expressions Algebra 2 Unit 2 Day 5

Warm-Up

1. $2a\left(\frac{2}{a}\right) = \left(4 + \frac{4}{2a}\right)2a$ $a \neq 0$

$2\cancel{a}\left(\frac{2}{\cancel{a}}\right) = 2a(4) + \cancel{2a}\left(\frac{4}{\cancel{2a}}\right)$

$4 = 8a + 4$

$0 = 8a$

$\cancel{0 = a}$ Reject $\varnothing$

2. $x(x-4)\left(\frac{x+4}{x} + \frac{3}{x-4}\right) = \left(\frac{-16}{x^2 - 4x}\right)x(x-4)$

$x^2 - 4x$ → $x(x-4)$

$\cancel{x}(x-4)\left(\frac{x+4}{\cancel{x}}\right) + x\cancel{(x-4)}\left(\frac{3}{\cancel{x-4}}\right) = \cancel{x(x-4)}\left(\frac{-16}{\cancel{x^2-4x}}\right)$

$(x-4)(x+4) + 3x = -16$

$x^2 + 4x - 4x - 16 + 3x = -16$

$x^2 + 3x = 0$

$x(x+3) = 0$

$\cancel{x = 0}$ reject | $x = -3$

$x \neq 0, 4$

$\{-3\}$

Complex Fractions

Def → A complex fraction is a fraction in which the numerator or denominator contain one or more fractions or negative exponents.

- To simplify means to write it as a fraction in lowest terms with no fractions in the numerator or denominator.
- In order to simplify a complex fraction, multiply the numerator **and** denominator by the LCD of all the fractions. (Think, "How can I multiply to get rid of these denominators?")
- Note: Remember to distribute the LCD when you have a binomial numerator or denominator.

Simplify

1.
$$\frac{2x\left(\frac{x}{2}+\frac{1}{x}\right)}{2x\left(\frac{1}{2x}\right)} = \frac{\cancel{2}x\left(\frac{x}{\cancel{2}}\right)+\cancel{x}2\left(\frac{1}{\cancel{x}}\right)}{\cancel{2x}\left(\frac{1}{\cancel{2x}}\right)} = \frac{x^2+2}{1} = \boxed{x^2+2}$$

2.
$$\frac{x^2\left(1-\frac{1}{x}\right)}{x^2\left(1-\frac{1}{x^2}\right)} = \frac{x^2(1)-x^{\cancel{2}}\left(\frac{1}{\cancel{x}}\right)}{x^2(1)-\cancel{x^2}\left(\frac{1}{\cancel{x^2}}\right)} = \frac{x^2-x}{x^2-1} = \frac{x\cancel{(x-1)}}{\cancel{(x-1)}(x+1)} = \boxed{\frac{x}{x+1}}$$

3. $$\frac{x^2y^2\left(\frac{1}{x}-\frac{1}{y}\right)}{x^2y^2\left(\frac{1}{x^2}-\frac{1}{y^2}\right)} = \frac{\cancel{x^2}y^2\left(\frac{1}{\cancel{x}}\right)-x^2\cancel{y^2}\left(\frac{1}{\cancel{y}}\right)}{\cancel{x^2}y^2\left(\frac{1}{\cancel{x^2}}\right)-x^2\cancel{y^2}\left(\frac{1}{\cancel{y^2}}\right)}$$

$$= \frac{xy^2-x^2y}{y^2-x^2}$$

$$= \frac{xy\cancel{(y-x)}}{\cancel{(y-x)}(y+x)}$$

$$= \boxed{\frac{xy}{y+x}}$$

4. $$\frac{y^2\left(4-\frac{1}{y^2}\right)}{y^2\left(\frac{2}{y}-\frac{1}{y^2}\right)} = \frac{y^2(4)-\cancel{y^2}\left(\frac{1}{\cancel{y^2}}\right)}{y^{\cancel{2}}\left(\frac{2}{\cancel{y}}\right)-\cancel{y^2}\left(\frac{1}{\cancel{y^2}}\right)}$$

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

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

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

5. $$\frac{2x\left(\frac{3}{x}+\frac{x}{2}\right)}{2x\left(1-\frac{1}{x}\right)} = \frac{\cancel{2x}\left(\frac{3}{\cancel{x}}\right)+\cancel{2}x\left(\frac{x}{\cancel{2}}\right)}{2x(1)-2\cancel{x}\left(\frac{1}{\cancel{x}}\right)}$$

$$= \frac{6+x^2}{2x-2}$$

6. $$\frac{xy\left(\frac{y}{x}-1\right)}{xy\left(\frac{1}{x}-\frac{1}{y}\right)} = \frac{xy\left(\frac{y}{x}\right)-xy(1)}{xy\left(\frac{1}{x}\right)-xy\left(\frac{1}{y}\right)}$$

y

Discuss with partner and write a response:

a) What is a complex fraction?

b) Can you think of another way to simplify the complex fraction below (example 1 from earlier)? Try.

$$\frac{\frac{x}{2}+\frac{1}{x}}{\frac{1}{2x}}$$

c) Would multiplying by the reciprocal be a good choice for example 2 shown below? Try it. Why or why not?

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