

ALGEBRA PROBLEM SESSION #8 SOLUTIONS

Multiplying and Dividing Rational Expressions and Functions

1. Yes, the two answers are the same, i.e. : $\frac{a-3b}{2b-a} = \left(\frac{a-3b}{2b-a}\right)\left(\frac{-1}{-1}\right) = \frac{-a+3b}{-2b+a} = \frac{3b-a}{a-2b}$
2. You can divide out the 4's in parts a., d., and e.
3. $\frac{y+3xy}{4xy+5x} = \frac{y(3x+1)}{x(4y+5)} \neq \frac{1+3y}{4x+5}$
4. When multiplying two rational expressions it is possible that the product will be zero only when one of the expressions (factors) is a zero or both factors are zero.
5. $\frac{x^3+x^2-42x}{2x^2+8x-42} = \frac{x(x-6)}{2(x-3)} \quad (x \neq -7)$
6. $\frac{x+5}{5x+25} = \frac{1}{5} \quad (x \neq -5)$
7. $\frac{3y-18}{y-6} = 3 \quad (y \neq 6)$
8. The domain of the function is the set of all x such that x is a real number and $x \neq \frac{7}{4}$ or $D = \left\{x \in \mathbb{R} \mid x \neq \frac{7}{4}\right\}$
9. $D = \{x \in \mathbb{R} \mid x \neq -4 \text{ and } x \neq 1\}$
10. $\frac{10-n}{n-7} \quad (n \neq 5)$
11. $\frac{x+5}{x-12} \quad (x \neq 8)$
12. $\frac{3a}{2} \quad (x \neq -\frac{5}{2}, 0; a \neq 0; y \neq \frac{-3}{5})$
13. $\frac{x+8}{4-x} \quad (x \neq 5 \text{ and } x \neq -1)$
14. $f(-1) = 0, f(3)$ is undefined; $g(-1) = -\frac{3}{5}, g(0) = -\frac{1}{4}$
15. You can simplify a rational expression with opposite factors in the numerator and the denominator by setting the quotient of the factors equal to -1 .

Adding and Subtracting Rational Expressions, Functions, and Equations

1. $f(x) + g(x) = \frac{x^2+6x+13}{2(x+3)}$ and $f(x) - g(x) = \frac{x^2+6x+5}{2(x+3)}$
2. The LCD of the denominators of two rational expressions where one denominator is a multiple of the other denominator is equal to the denominator with the extra factor, e.g. for the two rational expressions $\frac{1}{ab}$ and $\frac{1}{b}$ the LCD is ab .
3. $\frac{-x^2-4y^2-4xy}{(x+2y)^2(x-2y)} \quad (y \neq -\frac{x}{2}, \frac{x}{2})$
4. $\frac{x^2-10x-2xy+2y-3}{2(x+1)^2(x-1)} \quad (x \neq -1, 1)$
5. $-\frac{6m}{-2m^3+m^2+13m+6} \quad (m \neq -\frac{1}{2}, -2, 3)$

ALGEBRA PROBLEM SESSION #8 SOLUTIONS

Complex Rational Expressions

1. $\frac{4-x}{5x-3} (x \neq 0)$
2. $-\frac{1}{x^2+6x} (x \neq -6, 0)$
3. $\frac{xy}{x+y} (x \neq 0, y \neq 0)$
4. $\frac{4x}{2x^2+x+3} (x \neq -1, 1)$
5. $-\frac{6}{5} (x \neq -1, 1)$
6. $f\left(\frac{1}{x-6}\right) = \frac{\frac{1}{x-6}+1}{1-\frac{1}{x-6}} = \frac{x-5}{x-7} (x \neq 6, 7)$

Dividing Polynomials

1. $\frac{22r^2u^2-16r^2u^4-12r^2u^5}{2r^2u^4} = \frac{11}{u^2} - 6u - 8 (r \neq 0)$
2. $\frac{y^3(-6n^5y-3n^4+1)}{n^5} (n \neq 0, y \neq 0)$
3. $-\frac{2}{x} + \frac{1}{y} - 3 (x \neq 0, y \neq 0)$
4. $10x - 30 + \frac{60}{x+3}, (x \neq -3)$
5. $5x - 3 (x \neq \frac{2}{3})$
6. $5x - 13 + \frac{33}{2x+3}, (x \neq -\frac{3}{2})$
7. $y - 7 + \frac{8}{y+2} (y \neq -2)$
8. $\frac{t^2}{2} - \frac{2}{t-1}, (t \neq 1)$
9. $\frac{t^2}{5} + \frac{2t}{25} + \frac{4}{125} - \frac{992}{125(5t-2)}, (t \neq \frac{2}{5})$
10. a. $x^2 - 2x - \frac{27}{2} - \frac{57}{2(2x-5)}$ b. $2x^2 + 3x - 1$
11. When performing polynomial long division, you should stop dividing when the degree of the remainder is less than the degree of the divisor
12. After performing polynomial long division, you can check the answer by multiplying the divisor and the quotient and adding the remainder, the result should equal the dividend.