

Test Two

22. $\exists x (x-1) = 0$

$$\exists x = 0$$

$$x = 0$$

$$x-1 = 0$$

X

$$x = 1$$

Chapter 7: Rational Expressions

7.1: Simplifying Rational Expressions

Rational Expression

A rational expression is an expression that can be written in the form $\frac{P}{Q}$, where P and Q are polynomials and $Q \neq 0$.

ex:

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

$$\frac{2x^2 - 5x + 4}{3x + 1}$$

Note: $\frac{6}{0} = \text{undefiniert}$

Ex: (p 434)

Where are the Following Undefined:

10. $\frac{3}{5x}$

$$5x \neq 0$$

$$x \neq 0$$

12. $\frac{5x + 1}{x - 9}$

$$x - 9 \neq 0$$

$$x \neq 9$$

20. $\frac{19x^3 + 2}{x^2 + 4}$

$$x^2 + 4 \neq 0$$

$$x^2 \neq -4$$

no restrictions

22. $\frac{x}{2x^2 + 15x + 27}$

$$\frac{x}{2x^2 + 15x + 27}$$

$$2x^2 + 15x + 27 \neq 0$$

54

9,6

$$2x^2 + 9x + 6x + 27 \neq 0$$

$$x(2x+9) + 3(2x+9) \neq 0$$

$$(2x+9)(x+3) \neq 0$$

$$2x+9 \neq 0$$

$$x+3 \neq 0$$

$$2x \neq -9$$

$$x \neq -3$$

$$x \neq -\frac{9}{2}$$

Simplifying

EX: $\frac{6}{8} = \frac{\cancel{2} \cdot 3}{\cancel{2} \cdot 4} = \frac{3}{4}$

Simplify:

28. $\frac{y+9}{9+y} = \frac{\cancel{y+9}}{\cancel{y+9}} = 1$

30. $\frac{y-9}{9-y} = \frac{y-9}{(-1)(-1+y)} = \frac{\cancel{y-9}}{(-1)\cancel{(y-9)}}$

32. $\frac{3}{9x+6} = \frac{1}{-1} = -1$

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

$$36. \frac{3x - 9}{4x - 16} = \frac{3(x-3)}{4(x-4)}$$

$$38. \frac{-4x - 4y}{x + y} = \frac{-4(\cancel{x+y})}{1(\cancel{x+y})} = -4$$

$$40. \frac{9x + 99}{x^2 + 11x} = \frac{9(\cancel{x+11})}{x(\cancel{x+11})} = \frac{9}{x}$$

$$46. \frac{x^4 - 10x^3}{x^2 - 17x + 70} = \frac{x^3(\cancel{x-10})}{(x-7)(\cancel{x-10})}$$

$$48. \frac{4x^2 + 24x}{x + 6} = \frac{x^3}{x-7}$$

$$\frac{4x(\cancel{x+6})}{\cancel{x+6}} = 4x$$

$$54. \frac{5x^2 - 500}{35x + 350} = \frac{5(x^2 - 100)}{35(x+10)} = \frac{\cancel{5}(x+10)(x-10)}{\cancel{35}(x+10)}$$

$$56. \frac{49 - y^2}{y - 7} \quad \frac{x-10}{7}$$

$$\frac{(7-y)(7+y)}{y-7}$$

$$\frac{(-1)(\cancel{-7+y})(7+y)}{\cancel{y-7}}$$

$$(-1)(7+y) \simeq -(7+y)$$

$$\simeq -7-y$$

$$\frac{x^2 - 16}{x^2 - 8x + 16} = \frac{(x+4)\cancel{(x-4)}}{(x-4)\cancel{(x-4)}} = \frac{x+4}{x-4}$$

58. $\frac{x^2 - 16}{x^2 - 8x + 16}$

60. $\frac{m^2 - 4m + 4}{m^2 + m - 6}$

62. $\frac{24y^2 - 8y^3}{15y - 5y^2}$

$$\frac{m^2 - 4m + 4}{m^2 + m - 6} = \frac{\cancel{(m-2)}(m-2)}{\cancel{(m-2)}(m+3)} = \frac{m-2}{m+3}$$

$$\frac{24y^2 - 8y^3}{15y - 5y^2} = \frac{8y^2 \cancel{(3-y)}}{\cancel{5y} \cancel{(3-y)}} = \frac{8y}{5}$$

$$64. \frac{ab + ac + b^2 + bc}{b + c}$$

$$66. \frac{xy - 6x + 2y - 12}{y^2 - 6y}$$

$$\frac{\overbrace{ab + ac} + \overbrace{b^2 + bc}}{b + c}$$

$$\frac{a(b+c) + b(b+c)}{b+c}$$

$$\frac{\overbrace{(b+c)}^{|} (a+b)}{\overbrace{b+c}^{|}}$$

$$a+b$$

$$\frac{\overbrace{xy - 6x} + \overbrace{2y - 12}}{y^2 - 6y}$$

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

$$\frac{\cancel{(y-6)}(x+2)}{y\cancel{(y-6)}}$$

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

72. $\frac{2xy + 2x - 3y - 3}{2xy + 4x - 3y - 6}$

7.2: Multiplying and Dividing Rational Expressions

Ex: (p 442)

$$2. \frac{9x^2}{y} \cdot \frac{4y}{3x^3}$$

$$4. \frac{6x^2}{10x^3} \cdot \frac{5x}{12}$$

$$6. -\frac{9x^3y^2}{18xy^5} \cdot y^3$$

$$8. \frac{4x - 24}{20x} \cdot \frac{5}{x - 6}$$

$$10. \frac{x^2 + x}{8} \cdot \frac{16}{x + 1}$$

$$16. \frac{x^2 + 9x + 20}{x^2 - 15x + 44} \cdot \frac{x^2 - 11x + 28}{x^2 + 12x + 35}$$

$$18. \frac{9y^4}{6y} \div \frac{y^2}{3}$$

$$20. \frac{7a^2b}{3ab^2} \div \frac{21a^2b^2}{14ab}$$

$$22. \frac{(x + 3)^2}{5} \div \frac{5x + 15}{25}$$

$$26. \frac{(m-n)^2}{m+n} \div \frac{m^2-mn}{m}$$

$$28. \frac{x-3}{2-x} \div \frac{x^2+3x-18}{x^2+2x-8}$$

$$30. \frac{x+1}{(x+1)(2x+3)} \div \frac{20x+100}{2x+3}$$

7.3: Adding and Subtracting Rational Expressions with Common Denominators and Least Common Denominator

Ex: (p 449)

$$2. \frac{x+1}{7} + \frac{6}{7}$$

$$4. \frac{3p}{2q} + \frac{11p}{2q}$$

$$6. \frac{8y}{y-2} - \frac{16}{y-2}$$

$$10. \frac{x^2+9x}{x+7} - \frac{4x+14}{x+7}$$

$$12. \frac{3y}{y^2+3y-10} - \frac{6}{y^2+3y-10}$$

$$18. \frac{6x^2}{2x-5} - \frac{25+2x^2}{2x-5}$$

7.4: Adding and Subtracting Rational Expressions with Unlike Denominators

Ex: (p 455)

$$2. \frac{15}{7a} + \frac{8}{6a}$$

$$4. \frac{4c}{d} - \frac{8d}{5}$$

$$10. \frac{5}{x-4} + \frac{4x}{x^2-16}$$

$$12. \frac{5}{y^2} - \frac{y}{2y+1}$$

$$14. \frac{15}{y-4} + \frac{20}{4-y}$$

$$16. \frac{5}{a-7} + \frac{5}{7-a}$$

$$18. \frac{-9}{25x^2-1} + \frac{7}{1-25x^2}$$

$$20. \frac{7}{x^2} - 5x$$

$$24. \frac{7}{2x-3} - 3$$

$$30. \frac{5x}{6} + \frac{11x^2}{2}$$

$$32. \frac{5x}{(x-2)^2} - \frac{3}{x-2}$$

$$36. \frac{6}{x} - 1$$

$$40. \frac{10}{3n-4} - \frac{5}{4-3n}$$

$$42. \frac{5}{(x+1)(x+5)} - \frac{2}{(x+5)^2}$$

$$44. \frac{x}{x^2-4} - \frac{5}{x^2-4x+4}$$

$$50. \frac{-1}{a-2} + \frac{4}{4-2a}$$

$$54. \frac{-7}{y^2-3y+2} - \frac{2}{y-1}$$

$$58. \frac{x+4}{x^2+12x+20} + \frac{x+1}{x^2+8x-20}$$

7.8: Simplifying Complex Fractions

Ex: (492)

$$2. \frac{\frac{1}{8}}{-\frac{5}{12}}$$

$$8. \frac{\frac{3}{4} - \frac{1}{2}}{\frac{3}{8} + \frac{1}{6}}$$

$$12. \frac{\frac{7}{10} - \frac{3}{5}}{\frac{1}{2}}$$

$$18. \frac{\frac{x}{2} + 2}{\frac{x}{2} - 2}$$

$$22. \frac{x - \frac{1}{2x+1}}{1 - \frac{x}{2x+1}}$$

$$28. \frac{3}{1 - \frac{4}{3}}$$

$$30. \frac{\frac{m+2}{m-2}}{\frac{2m+4}{m^2-4}}$$

$$34. \frac{2 + \frac{6}{x}}{1 - \frac{9}{x^2}}$$

$$38. \frac{\frac{2}{x} + \frac{x}{2}}{\frac{2}{x} - \frac{x}{2}}$$

$$40. \frac{\frac{4}{x} + \frac{x}{x+1}}{\frac{1}{2x} + \frac{1}{x+6}}$$

