Rational Expressions

1) **Simplify the below rational expressions and state restrictions**

a. $\dfrac{2x^2+x-6}{x^2+4x-5} \cdot \dfrac{x^3-3x^2+2x}{4x^2-6x}$

b. $\dfrac{x^2-14x+49}{x^2-49} \div \dfrac{3x-21}{x+7}$

c. $\dfrac{\left(\dfrac{x^2-1}{x}\right)}{\dfrac{(x-1)^2}{x}}$

Rational Expressions

Answers

1) Simplify the below rational expressions and state restrictions

a. $\dfrac{2x^2+x-6}{x^2+4x-5} \cdot \dfrac{x^3-3x^2+2x}{4x^2-6x}$

$= \dfrac{(2x-3)(x+2)}{(x+5)(x-1)} \cdot \dfrac{x(x-2)(x-1)}{2x(2x-3)}$

$= \dfrac{(x+2)(x-2)}{2(x+5)} \qquad x \neq -5$

b. $\dfrac{x^2-14x+49}{x^2-49} \div \dfrac{3x-21}{x+7}$

$\dfrac{(x-7)(x-7)}{(x+7)(x-7)} \times \dfrac{(x+7)}{3(x-7)} = \dfrac{(x-7)(x-7)(x+7)}{3(x+7)(x-7)(x-7)} = \dfrac{1}{3}$

c. $\dfrac{\left(\frac{x^2-1}{x}\right)}{\frac{(x-1)^2}{x}}$

$\dfrac{(x-1)(x+1)}{x} \times \dfrac{x}{(x-1)(x-1)} = \dfrac{x+1}{x-1} \qquad x \neq 1$

2) Simplify and solve for x in the following equations.

a) $\dfrac{1}{x-2} + \dfrac{3}{x+3} = \dfrac{4}{x^2+x-6}$

b) $\dfrac{6}{x+2} - \dfrac{3}{x^2+x-2} = \dfrac{x}{x^2+3x+2}$

Answers

2) Simplify and solve for x in the following equations.

a) $\dfrac{1}{x-2} + \dfrac{3}{x+3} = \dfrac{4}{x^2+x-6}$ Common denominator is $(x+3)(x-2)$

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

$\boxed{x \neq 2, -3}$

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

$$x + 3 + 3(x-2) = 4$$

$$x + 3 + 3x - 6 = 4$$

$$4x - 3 = 4$$

$$4x = 7$$

$$\boxed{x = 7/4} \checkmark$$

b) $\dfrac{6}{x+2} - \dfrac{3}{x^2+x-2} = \dfrac{x}{x^2+3x+2}$ <u>Common denominator</u>

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

$$\boxed{x \neq -2, -1, 1}$$

$$6(x+1)(x-1) - 3(x+1) = x(x-1)$$

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

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

$$5x^2 - 2x - 9 = 0$$

$$\boxed{x = -1.16, \ 1.56}$$