

Rational Expressions

1. Find an equivalent rational expression in lowest terms, and identify the value(s) of the variable that must be excluded to prevent division by zero.

a) $\frac{x^2-x-6}{5x^2+10x}$

b) $\frac{3-x}{x^2-9}$

c) $\frac{3x-3y}{y^2-2xy+x^2}$

d) $\frac{x^2-7x+12}{6-5x+x^2}$

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

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

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1. Find an equivalent rational expression in lowest terms, and identify the value(s) of the variable that must be excluded to prevent division by zero.

a) $\frac{x^2-x-6}{5x^2+10x}$

$$\begin{aligned} & \frac{x^2 - x - 6}{5x^2 + 10x} \\ &= \frac{(x+2)(x-3)}{5x(x+2)} \\ &= \frac{x-3}{5x} \quad x \neq 0 \text{ and } x \neq -2 \end{aligned}$$

b) $\frac{3-x}{x^2-9}$

$$\begin{aligned} & \frac{3-x}{x^2-9} \\ &= \frac{-(x-3)}{(x-3)(x+3)} \\ &= -\frac{1}{x+3} \quad x \neq 3 \text{ and } x \neq -3 \end{aligned}$$

c) $\frac{3x-3y}{y^2-2xy+x^2}$

$$\begin{aligned} & \frac{3x-3y}{y^2-2xy+x^2} \\ &= \frac{-3(y-x)}{(y-x)(y-x)} \\ &= -\left(\frac{3}{y-x}\right) \\ & \quad y \neq x \end{aligned}$$

d) $\frac{x^2-7x+1}{6-5x+x^2}$

$$\begin{aligned} & \frac{x^2-7x+12}{6-5x+x^2} \\ &= \frac{(x-4)(x-3)}{(x-3)(x-2)} \\ &= \frac{x-4}{x-2} \\ & \quad x \neq 3 \text{ and } x \neq 2 \end{aligned}$$

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

$$\begin{aligned} & \frac{x^2+5x+4}{(x+1)(x+2)(x-3)} \\ &= \frac{(x+1)(x+4)}{(x+1)(x+2)(x-3)} \\ &= \frac{x+4}{(x+2)(x-3)} \end{aligned}$$

$x \neq -1, x \neq -2, \text{ and } x \neq 3$

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

$$\begin{aligned} & \frac{2(x+1)+2}{(2x+3)(x+1)-1} \\ &= \frac{2x+4}{2x^2+5x+2} \\ &= \frac{2}{(2x+1)(x+2)} = \frac{2}{2x+1} \end{aligned}$$

$x \neq -2 \text{ and } x \neq -\frac{1}{2}$

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