

Solve the following rational equations by hand.

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

2. $\frac{x}{x+3} = \frac{3}{19}$

3. $\frac{24}{r-3} = \frac{36}{r+3}$

4. $\frac{10}{r^2-4} - \frac{3}{r-2} = \frac{6}{r+2}$

5. $\frac{1}{b^2-7b+10} + \frac{1}{b-2} = \frac{2}{b^2-7b+10}$

Solve the following rational inequalities by hand.

6. $\frac{4}{x} > 3$

7. $\frac{x+2}{x-1} < 4$

8. $\frac{x^2+3x+2}{x+4} \leq 0$

9. $\frac{1}{x} + \frac{3}{4} \geq \frac{1}{2}$

10. $\frac{3}{x+2} + \frac{1}{x^2-x-6} \geq \frac{2}{x-3}$

Simplify

$$11. \frac{2b+6}{b+3}$$

$$12. \frac{x^2+17x+70}{x^2+16x+63}$$

$$13. \frac{2x^2+13x+6}{5x^3+25x^2-30x}$$

$$14. \frac{6x^2+30x}{7} \cdot \frac{7}{x+5}$$

$$15. \frac{9m-45}{7m+4} \cdot \frac{35m^2+20m}{5m^2-25m}$$

$$16. \frac{x+2}{x^2+2x-80} \div \frac{1}{x+10}$$

$$17. \frac{7n+1}{42n+6} \div \frac{15n+15}{50n+50}$$

$$18. \frac{2x}{2} + \frac{5}{2x+8}$$

$$19. \frac{6a}{a-3} - \frac{7}{a-2}$$

$$20. \frac{x}{x^2-x-6} - \frac{3}{x^2-2x-8}$$

$$21. \frac{5}{x^2-9} + \frac{x}{x^2-x-12}$$