

Solving Rational Inequalities

1. $\frac{8}{x+2} < \frac{2}{1} \quad x \neq -2$ 2. $\frac{10}{x-5} \geq \frac{2}{1} \quad x \neq 5$

$8 = 2x + 4$ $10 = 2x - 10$
 $4 = 2x$ $20 = 2x$
 $2 = x$ $10 = x$

Test 3: $2 < 2$ No
 Test 5: $5 < 2$ No

So $(-\infty, -2) \cup (2, \infty)$ So $(5, 10]$

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3. $\frac{3}{x-1} < 3$ 4. $\frac{6}{x+4} > 2$

5. $\frac{12}{x+4} \leq 4$ 6. $\frac{7}{x+3} < -5$

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7. $\frac{x}{x-2} > 9$ 8. $\frac{2x}{x-5} \geq 3$

9. $\frac{x-1}{x} < 2$ 10. $\frac{3x}{x+5} \leq -4$

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$$11. \frac{2-x}{x+3} \geq 4$$

$$12. \frac{x}{4-x} < 3$$

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$$13. \frac{6}{x+1} < -3$$

$$14. \frac{x}{x-2} < 0$$

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$$15. \frac{2x}{x+5} \leq 0$$

$$16. \frac{x}{-x-2} \geq 9$$

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Add these two problems

$$17. \frac{x-2}{2(x-3)} > \frac{x}{x+3}$$

$$18. \frac{2}{x-1} + \frac{2}{x+1} = \frac{-4}{x^2-1}$$

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Homework

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

$$2. \frac{4}{x-2} \geq 3$$

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3. $\frac{2}{x+3} < 4$

4. $\frac{5}{6-x} > 7$

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5. $\frac{7}{5+x} \leq -6$

6. $\frac{-6}{7-x} > 5$

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

8. $\frac{x+1}{x} \leq 2$

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9. $\frac{2x}{x-1} < 1$

10. $\frac{x-1}{x+2} > 0$

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11. $\frac{x-2}{x-1} \geq 2x$

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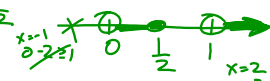
12. $2x+1 \geq \frac{1}{2x+1}$

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$$13. \frac{t}{t-1} - \frac{2}{t+1} \leq \frac{5}{t^2-1}$$

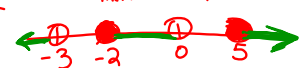
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$$14. \frac{x+1}{x-1} + \frac{2}{x} \geq 1$$

$\frac{x(x+1)}{x(x-1)} + \frac{2(x-1)}{x(x-1)} \geq \frac{(x-1)x}{(x-1)x}$
 $x^2 + x + 2x - 2 = x^2 - 1x$
 $4x = 2$
 $x = \frac{1}{2}$
 crit pt: $x = 0, 1, \frac{1}{2}$

 $(0, \frac{1}{2}] \cup (1, \infty)$
 $x=2$
 $\frac{3}{1} + \frac{2}{2} = 1$
 $4 \geq 1$
 $4 > 1$

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$$15. \frac{a-3}{3a} \geq \frac{1}{3a^2+9a} + \frac{1}{a+3}$$

$\frac{(a-3)(a+3)}{3a(a+3)} = \frac{1}{3a(a+3)} + \frac{3a \cdot 1}{3a(a+3)}$
 $a^2 - 9 = 1 + 3a$
 $a^2 - 3a - 10 = 0$
 $(a-5)(a+2) = 0$
 $a = 5, -2$
CRITICAL #'s
 $0, -3, 5, -2$
 included included

Answer:
 $(-\infty, -3) \cup [-2, 0)$
 test $a = -4$: $\frac{-4-3}{-12} = \frac{7}{12} \geq \frac{1}{-12(-1)} + \frac{1}{-4+3}$
 $\frac{7}{12} \geq \frac{1}{12} - 1$
 $\frac{7}{12} \geq \frac{1-12}{12}$
 $\frac{7}{12} \geq \frac{-11}{12}$
 $7 \geq -11$
 yes
 test $a = -1$: $\frac{-1-3}{-3} = \frac{4}{3} \geq \frac{1}{3(-1)(-2)} + \frac{1}{-1+3}$
 $\frac{4}{3} \geq \frac{1}{6} + \frac{1}{2}$
 $\frac{4}{3} \geq \frac{1+3}{6}$
 $\frac{4}{3} \geq \frac{4}{6}$
 $\frac{4}{3} \geq \frac{2}{3}$
 yes

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