

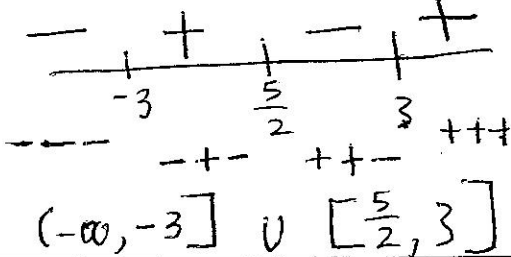
Ex4) Solve: $2x^3 - 5x^2 - 18x + 45 \leq 0$ neg
zero

$$x^2(2x-5) - 9(2x-5)$$

$$(2x-5)(x^2-9)$$

$$(2x-5)(x+3)(x-3) \leq 0$$

zeros: $x = \frac{5}{2}, -3, 3$

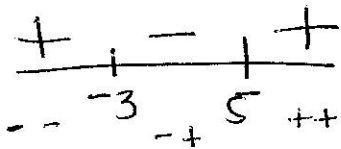


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Ex6) $x^2 - 2x - 15 \geq 0$

$$(x-5)(x+3) \geq 0$$

$x = 5, x = -3$



$$(-\infty, -3] \cup [5, \infty)$$

Additional Notes on Solving Rational Inequalities:

Ex8) Given the function below, determine the values of x that cause $f(x)$ to be:

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

(a) zero $x = -\frac{1}{2}$

(b) positive

$$(-3, -\frac{1}{2}) \cup (1, \infty)$$

(c) negative

$$(-\infty, -3) \cup (-\frac{1}{2}, 1)$$

**When making a sign chart for rational functions include the "zeros" from Numerator & denominator **
(x-int) (undefined)

Based on the information above, determine the solutions to the following inequalities:

$$\frac{2x+1}{x^2+2x-3} > 0 \text{ pos}$$

$$(-3, -\frac{1}{2}) \cup (1, \infty)$$

$$\frac{2x+1}{x^2+2x-3} \leq 0 \text{ neg/zeros}$$

$$(-\infty, -3) \cup [-\frac{1}{2}, 1)$$

Ex5) Solve: $2x^3 - 7x^2 - 10x + 24 > 0$

rational root thm.

constant: 1, 2, 3, 4, 6, 8, 12, 24

i.c.: 1, 2

possible ratl. zeros = $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24, \pm \frac{1}{2}, \pm \frac{3}{2}$

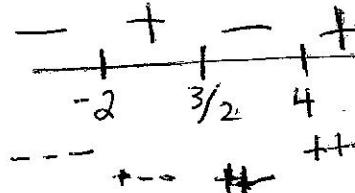
$$\begin{array}{r} -2 \end{array} \begin{array}{r} 2 \quad -7 \quad -10 \quad 24 \\ \underline{-4 \quad 22 \quad -24} \\ 2 \quad -11 \quad 12 \quad 0 \end{array}$$

$$2x^2 - 11x + 12 = 0$$

$$(2x-3)(x-4) = 0$$

$x = \frac{3}{2}, x = 4$

$$(x+2)(2x-3)(x-4) > 0$$



$$(-2, \frac{3}{2}) \cup (4, \infty)$$

Ex7) $x^3 - 9x^2 + 11x + 21 < 0$

constant: 1, 21, 3, 7

i.c.: 1

possible rat. zeros = $\pm 1, \pm 3, \pm 7, \pm 21$

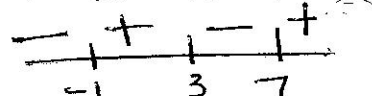
$$\begin{array}{r} 3 \end{array} \begin{array}{r} 1 \quad -9 \quad 11 \quad 21 \\ \underline{-3 \quad -18 \quad -21} \\ 1 \quad -6 \quad -7 \quad 0 \end{array}$$

$$x^2 - 6x - 7 = 0$$

$$(x-7)(x+1) = 0$$

$x = 7, -1$

$$(x-3)(x-7)(x+1) < 0$$



$$(-\infty, -1) \cup (3, 7)$$

Ex9) Solve: $\frac{5}{x+3} < -\frac{3}{x-1}$

$$\frac{5}{x+3} + \frac{3}{x-1} < 0$$

$$\frac{5x-5+3x+9}{(x+3)(x-1)} < 0$$

$$\frac{8x+4}{(x+3)(x-1)} < 0$$

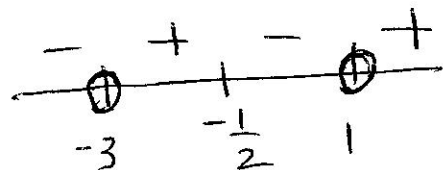
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Ex10) Solve: $\frac{5x+1}{2x^2} > \frac{9x+5}{4x^2+2x}$

$$\frac{4(2x+1)}{(x+3)(x-1)} < 0 \text{ neg}$$

$$\frac{5x+1}{2x^2} - \frac{9x+5}{4x^2+2x} > 0$$

zero: $-\frac{1}{2}$
undef.: $-3, 1$



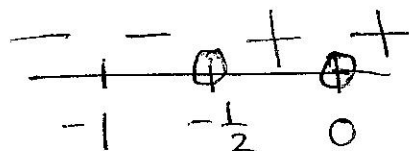
$$(-\infty, -3) \cup (-\frac{1}{2}, 1)$$

$$\frac{10x^2+5x+2x+1 - (9x^2+5x)}{2x^2(2x+1)} > 0$$

$$\frac{x^2+2x+1}{2x^2(2x+1)} > 0$$

$$\frac{(x+1)^2}{2x^2(2x+1)} > 0 \text{ pos}$$

zero: -1
undef.: $0, -\frac{1}{2}$



$$(-\frac{1}{2}, 0) \cup (0, \infty)$$

