Review Exercise Set 5

Exercise 1: Solve.

$$x^2 + 2x - 35 < 0$$

Exercise 2: Solve.

$$(x+3)(2x-1)(x-4) \geq 0$$

Exercise 3: Solve.

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

Exercise 4: Solve.

$$\frac{x-3}{(x-5)(x+2)} < 0$$

Exercise 5: Solve.

$$\frac{2x+3}{3x-5} \leq 3$$

Review Exercise Set 5 Answer Key

Exercise 1: Solve.

$$x^2 + 2x - 35 < 0$$

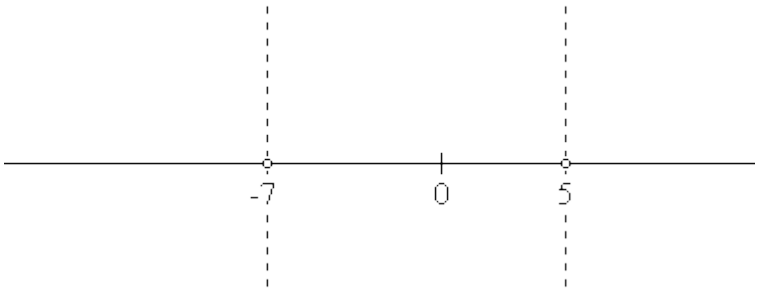
Factor the polynomial

$$(x+7)(x-5) < 0$$

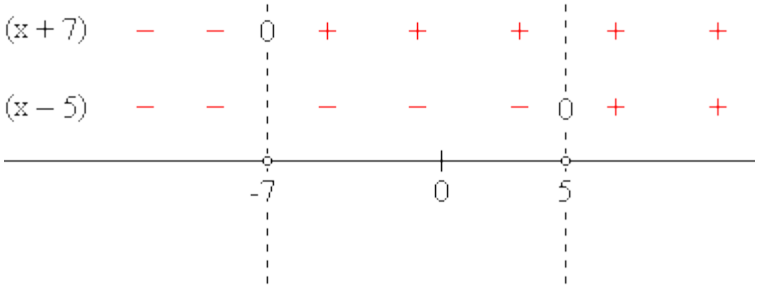
Set the equation equal to zero to determine the boundary values (the values of x that make each factor zero)

$$(x+7)(x-5) = 0$$
$$x+7=0 \quad or \quad x-5=0$$
$$x=-7 \qquad\qquad x=5$$

Draw a number line with vertical lines at the boundary values separating the line into three regions

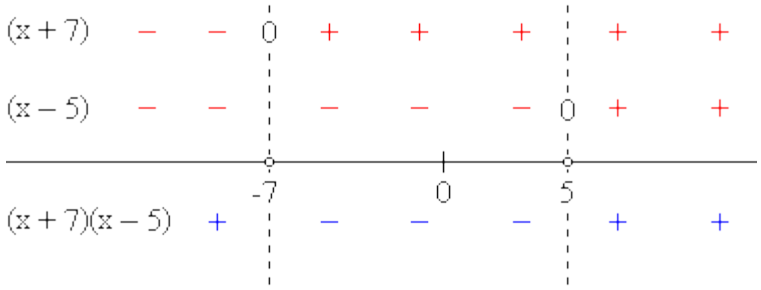


List both factors and their signs in each region

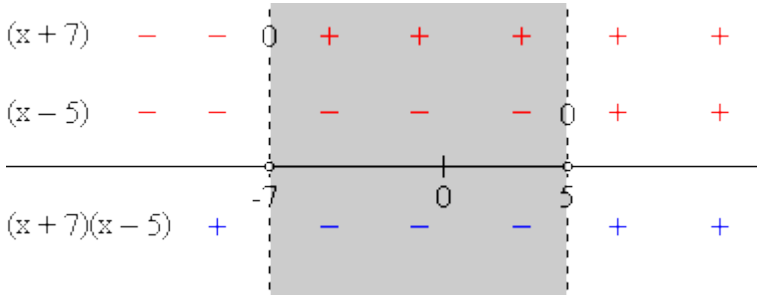


Exercise 1 (Continued):

Multiply the signs of the factors in each region to determine the signs of the polynomial



Locate regions where the polynomial has a negative sign



The solution is that x must be between -7 and 5 but not including the boundary values, which can be written in interval notation as -7 < x < 5.

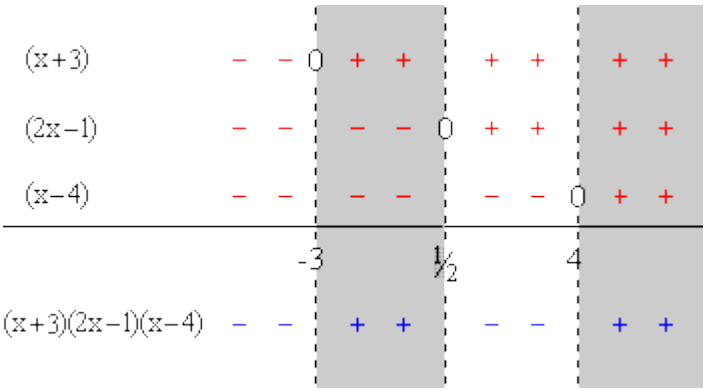
Exercise 2: Solve.

$$(x+3)(2x-1)(x-4) \geq 0$$

$$(x+3)(2x-1)(x-4) = 0$$

$$\begin{array}{ccccc} x+3=0 & or & 2x-1=0 & or & x-4=0 \\ x=-3 & & 2x=1 & & x=4 \\ x=-3 & & x=\frac{1}{2} & & x=4 \end{array}$$

Exercise 2 (Continued):



Since the polynomial must be greater than or equal to zero, the solution is the regions where the polynomial is positive. The solution in interval notation is:

$$-3 \le x \le \frac{1}{2} \cup x \ge 4$$

Exercise 3: Solve.

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

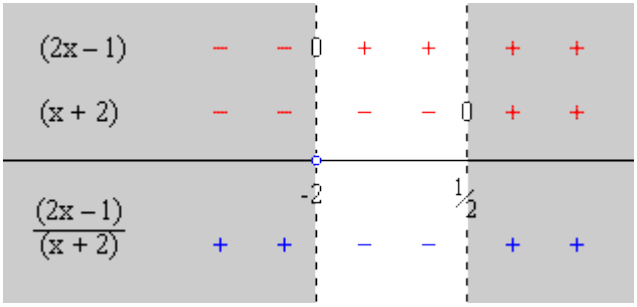
Set the numerator and denominator equal to zero to determine the boundary values (the values of x that make each factor zero)

$$2x-1=0 \quad or \quad x+2=0$$
$$2x=1 \qquad\qquad x=-2$$
$$x=\frac{1}{2} \qquad\qquad x=-2$$

Note: Since -2 will make the denominator equal to zero it cannot be part of the solution set.

Exercise 3 (Continued):

Draw a number line with vertical lines at the boundary values and determine the signs of the three regions



Since the rational expression must be greater than zero, the solution is the regions where the rational expression is positive. The solution in interval notation is:

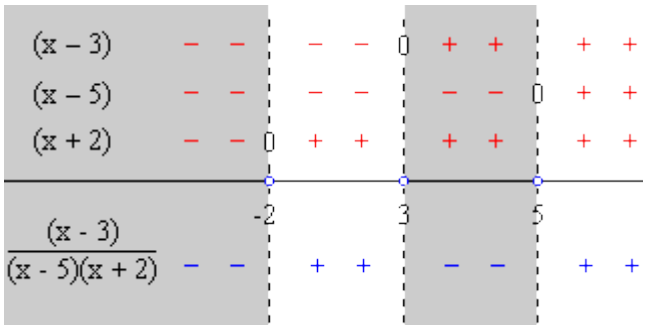
$x < -2 \cup x > \frac{1}{2}$

Exercise 4: Solve.

$$\frac{x-3}{(x-5)(x+2)} < 0$$

$x-3=0 \quad or \quad x-5=0 \quad or \quad x+2=0$

$x=3 \qquad x=5 \qquad x=-2$



Since the rational expression must be less than zero, the solution is the regions where the rational expression is negative. The solution in interval notation is:

$x < -2 \cup 3 < x < 5$

Exercise 5: Solve.

$$\frac{2x+3}{3x-5} \le 3$$

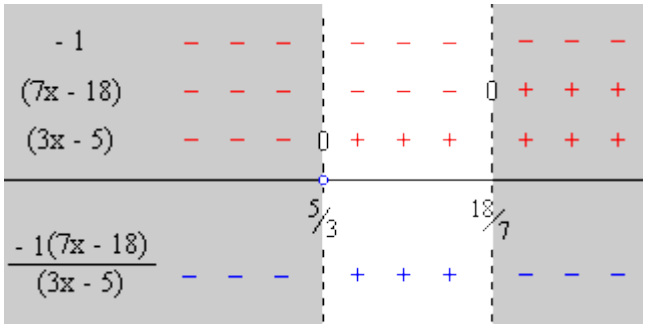
First, rewrite the equation so that there is a single rational expression on the left and zero on the right of the inequality

$$\begin{aligned}
\frac{2x+3}{3x-5} - 3 &\le 0 \\
\frac{2x+3}{3x-5} - 3\frac{3x-5}{3x-5} &\le 0 \\
\frac{2x+3}{3x-5} - \frac{9x-15}{3x-5} &\le 0 \\
\frac{2x+3-(9x-15)}{3x-5} &\le 0 \\
\frac{2x+3-9x+15}{3x-5} &\le 0 \\
\frac{-7x+18}{3x-5} &\le 0 \\
\frac{-1(7x-18)}{3x-5} &\le 0
\end{aligned}$$

Find boundary values

$$\begin{aligned}
7x-18=0 \quad & or \quad 3x-5=0 \\
7x=18 \quad & \qquad 3x=5 \\
x=\frac{18}{7} \quad & \qquad x=\frac{5}{3}
\end{aligned}$$

Locate negative regions



Exercise 5 (Continued):

Since the rational expression must be less than or equal to zero, the solution is the regions where the rational expression is negative. The solution in interval notation is $x < \frac{5}{3} \cup x \geq \frac{18}{7}$ **. The boundary value of 5/3 must be excluded from the solution set since it would make the denominator equal to zero so an equals sign is not included with the less than inequality sign.**