

Precalculus, Section 4.6, #36
 Polynomial and Rational Inequalities

Solve each inequality algebraically.¹

$$\frac{(x-3)(x+2)}{x-1} \leq 0$$

The first step is to compare to zero, and our inequality is already compared to zero. (Yay!)

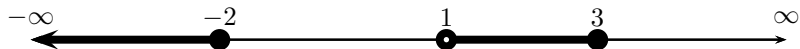
The second step is to have *one* rational expression on the left, and we do.

The third step is to factor the rational expression on the left, and it is.

Then the numbers that make the rational expression zero are $x = 3$ and $x = -2$, and the number that makes the expression undefined is $x = 1$. We put these on a number line, and then test the value of the rational expression for a number in each of the intervals.

	$-\infty$	-2	1	3	∞
test point	$x = 3$	⋮	$x = 0$	$x = 2$	$x = 4$
$x - 3$	-	⋮	-	-	+
$x + 2$	-	0	+	+	+
$x - 1$	-	⋮	0	+	+
$\frac{(x-3)(x+2)}{x-1}$	-	0	+	UD	-

The last row of our table shows the sign (*positive* or *negative*) of our function. Since we want the function to be less than or equal to zero, we want the intervals where the function is negative or zero.



Because the function is undefined at $x = 1$ (the denominator is zero), $x = 1$ cannot be a solution, and there is an open circle on the number line graph.

Finally, the solution to our inequality, written in interval notation, is

$$(-\infty, -2] \cup (1, 3]$$

¹Sullivan, *Precalculus: Enhanced with Graphing Utilities*, p. 242, #36.