EXAMPLE 5   **Creating a Sign Chart for a Rational Function**

Let $r(x) = (2x + 1)/((x + 3)(x - 1))$. Determine the values of x that cause $r(x)$ to be **(a)** zero, **(b)** undefined. Then make a sign chart to determine the values of x that cause $r(x)$ to be **(c)** positive, **(d)** negative.

EXAMPLE 6   **Solving a Rational Inequality by Combining Fractions**

$$\text{Solve} \left(\frac{x-1}{x-1}\right)\frac{5}{x+3} + \frac{3}{x-1}\left(\frac{x+3}{x+3}\right) < 0.$$

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

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

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

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

VA $x=1$, $x=-3$

x-int? $2x+1=0$
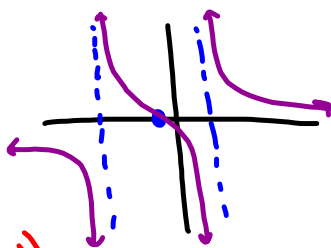$$x = -\frac{1}{2}$$

$\lim\limits_{x\to\infty} f(x) = 0$ $\lim\limits_{x\to-\infty} f(x) = 0$

$\lim\limits_{x\to 1^-} f(x) = -\infty$ $\lim\limits_{x\to 1^+} f(x) = \infty$

$\lim\limits_{x\to -\frac{1}{2}^-} f(x) = -\infty$ $\lim\limits_{x\to -\frac{1}{2}^+} f(x) = \infty$

$1000 \to x$

$(2x+1)/((x-1)(x+3))$

$P(x) < 0$ **ANS**

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

EXAMPLE 7   Solving an Inequality Involving a Radical
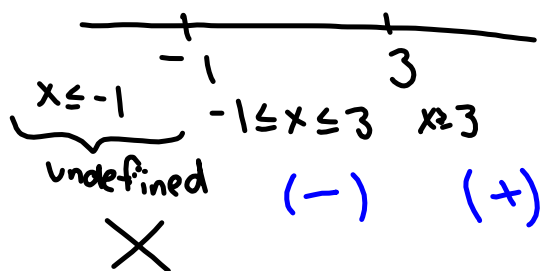
Solve $(x - 3)\sqrt{x + 1} \geq 0$.

zeros
$x = 3$

$\sqrt{x+1}$
$x + 1 \geq 0$
$x \geq -1$

SIGN CHART

$$\text{P265} \\ \#\, 25,27,42,49$$

$x \leq -1$ $\quad -1 \leq x \leq 3 \quad x \geq 3$

undefined $(-)$ $(+)$

$\times$

$P(x) \geq 0$

$[-1] \cup [3, \infty)$

EXAMPLE 8   Solving an Inequality Involving Absolute Value

Solve $\dfrac{x - 2}{|x + 3|} \leq 0$.