In exercises 1-6, complete the factoring if needed, and solve the polynomial inequality.

1. $(x+1)(x-3)^2 > 0$ $(-1, 3) \cup (3, \infty)$

2. $(2x+1)(x-2)(3x-4) \le 0$ $(-\infty, -\frac{1}{2}] \cup [\frac{4}{3}, 2]$

3. $(x+1)(x^2-3x+2) < 0$ $(-\infty, -1) \cup (1, 2)$

4. $(x+4)(x-1)^2 > 0$ $(-4, 1) \cup (1, \infty)$

5. $-x^3 - 2x^2 + 15x \le 0$ $[-5, 0] \cup [3, \infty)$

6. $2x^3 - 3x^2 - 11x + 6 \ge 0$ $[-2, \frac{1}{2}] \cup [3, \infty)$

In exercises 7-11, solve each inequality.

7. $\dfrac{x-1}{x^2-4} < 0$ $(-\infty, -2) \cup (1, 2)$

8. $\dfrac{x^2-1}{x^2+1} \le 0$ $[-1, 1]$

9. $\dfrac{x^2+x-12}{x^2-4x+4} > 0$ $(-\infty, -4) \cup (3, \infty)$

10. $\dfrac{x^2+3x-10}{x^2-6x+9} < 0$ $(-5, 2)$

11. $\dfrac{x-5}{x+1} < \dfrac{x+2}{x-3}$ $(-1, 13/11) \cup (3, \infty)$

solving Inequalities

1. zeros: $-1, 3$

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

$- \quad + \quad +$

$-1 \quad 3$

2. zeros: $-\frac{1}{2}, 2, \frac{4}{3}$

$(-\infty, -\frac{1}{2}] \cup [\frac{4}{3}, 2]$

$- \quad + \quad - \quad +$

$-\frac{1}{2} \quad \frac{4}{3} \quad 2$

3. $(x+1)(x-2)(x-1) < 0$

zeros: $-1, 2, 1$

$(-\infty, -1) \cup (1, 2)$

$- \quad + \quad - \quad +$

$-1 \quad 1 \quad 2$

4. zeros: $-4, 1$

$(-4, 1) \cup (1, \infty)$

$- \quad + \quad +$

$-4 \quad 1$

5. $-x(x^2 + 2x - 15) \leq 0$

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

zeros: $0, -5, 3$

$[-5, 0] \cup [3, \infty)$

$+ \quad - \quad + \quad -$

$-5 \quad 0 \quad 3$

6. $2x^3 - 3x^2 - 11x + 6 \geq 0$

c: $1, 2, 3, 6$

l.c.: $1, 2$

possible rtnl zeros: $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}$

$$\begin{array}{r|rrrr} -2 & 2 & -3 & -11 & 6 \\ & & -4 & 14 & -6 \\ \hline & 2 & -7 & 3 & 0 \end{array}$$

$2x^2 - 7x + 3 = 0$

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

$x = \frac{1}{2} \quad x = 3$

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

$- \quad + \quad - \quad +$

$-2 \quad \frac{1}{2} \quad 3$

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

7. $\dfrac{x-1}{(x+2)(x-2)} < 0$

zero: 1

undef: 2, -2

$- \quad + \quad - \quad +$

$-2 \quad 1 \quad 2$

$\frac{-}{--} \quad \frac{-}{+-} \quad \frac{+}{+-} \quad \frac{+}{++}$

$(-\infty, -2) \cup (1, 2)$

8. $\dfrac{(x+1)(x-1)}{x^2+1} \leq 0$

zeros: -1, 1

undef: none

$+ \quad - \quad +$

$-1 \quad 1$

$[-1, 1]$

9. $\dfrac{(x+4)(x-3)}{(x-2)(x-2)} > 0$

zeros: -4, 3

undef: 2

$+ \quad - \quad - \quad +$

$-4 \quad 2 \quad 3$

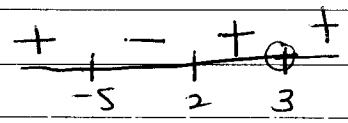
$(-\infty, -4) \cup (3, \infty)$

10. $\dfrac{(x+5)(x-2)}{(x-3)(x-3)} < 0$

zeros: $-5, 2$

undef: 3

$(-5, 2)$



11. $\dfrac{x-5}{x+1} - \dfrac{x+2}{x-3} < 0$

LCD: $(x+1)(x-3)$

$\dfrac{(x-5)(x-3) - (x+2)(x+1)}{(x+1)(x-3)} < 0$

$\dfrac{x^2-8x+15 - x^2-3x-2}{(x+1)(x-3)} < 0$

$\dfrac{-11x+13}{(x+1)(x-3)} < 0$

zero: $\dfrac{13}{11}$

undef: $-1, 3$

$(-1, 13/11) \cup (3, \infty)$