

# Polynomial and rational equations and inequalities

Solve, exactly, the following equations and inequalities.

1.  $x(x - 1)(x - 2) > 0$

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

3.  $(1 - x)x^6 \geq 0$

4.  $x^4 + 5x^3 + 12x^2 + 13x + 5 \geq 0$

5.  $x^5 - 5x^3 + 6x \leq 0$

6.  $\frac{(x + 1)(x - 2)}{(x - 3)(x - 4)} > 0$

7.  $\frac{x^2 + 4x + 5}{x^2 + 4x + 3} < 0$

8.  $\frac{x^2 - x}{x^2 - 1} \geq 0$

9.  $\frac{x^2 + 2x - 3}{x^3 + 5x^2 + 8x + 4} \leq 0$

10.  $\frac{2}{x - 2} > \frac{1}{x - 3}$

11.  $\frac{x}{x^2 - 3x + 2} \geq \frac{1}{x + 1}$

12.  $\frac{2x + 1}{x^2 + 5x + 6} \leq \frac{3}{x + 2}$

13.  $|x + 2| = 2x - 3$

14.  $|x - 2| < |x + 3|$

15.  $|x - 1| + |x| = 5$

16.  $|x + 2| + |x - 1| < 7$

17.  $\frac{x}{|x + 1|} = \frac{1}{x + 1}$

18.  $|x + 1|(x - 2) < 1$

19.  $|x^2 - 3x| = 1$

20.  $|x^2 + 4x| > 3$

21.  $3 \leq |x^2 + 2x| < 8$

22.  $|x^3 - 3x| = 2$

23.  $|x^3 + x + 1| \geq 1$