Solving Absolute Value Inequalities

Let u be an algebraic expression in x and let a be a real number with $a \geq 0$.

1. If $|u| < a$, then u is in the interval $(-a, a)$. That is,

$$|u| < a \quad \text{if and only if} \quad -a < u < a.$$

2. If $|u| > a$, then u is in the interval $(-\infty, -a)$ or (a, ∞), that is,

$$|u| > a \quad \text{if and only if} \quad u < -a \ \text{ or } \ u > a.$$

The inequalities $<$ and $>$ can be replaced with $\leq$ and $\geq$, respectively.

Solving an Absolute Value Inequality

Solve $|x - 4| < 8$.

Solving Another Absolute Value Inequality

Solve $|3x - 2| \geq 5$.

Solving a Quadratic Inequality

Solve $x^2 - x - 12 > 0$.

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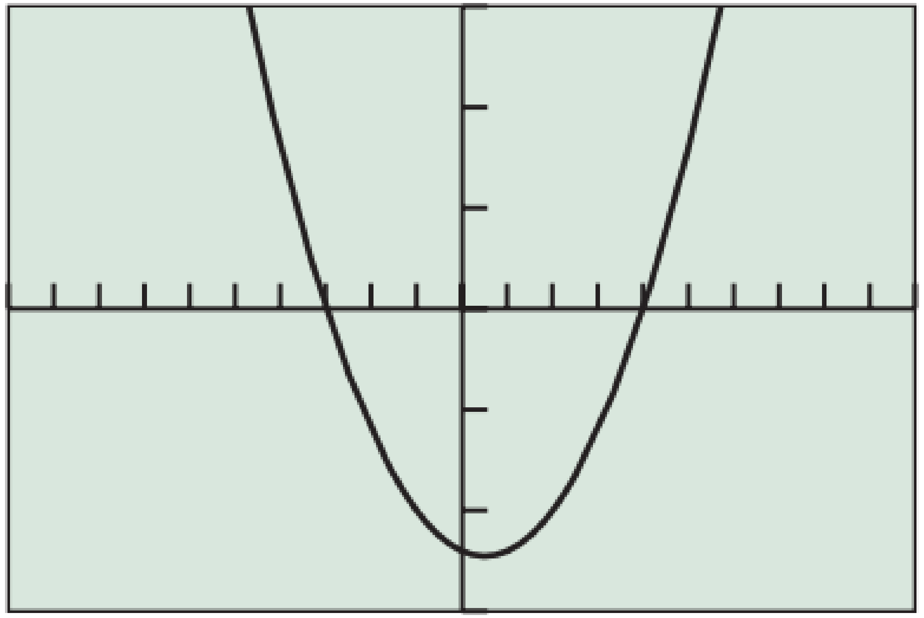
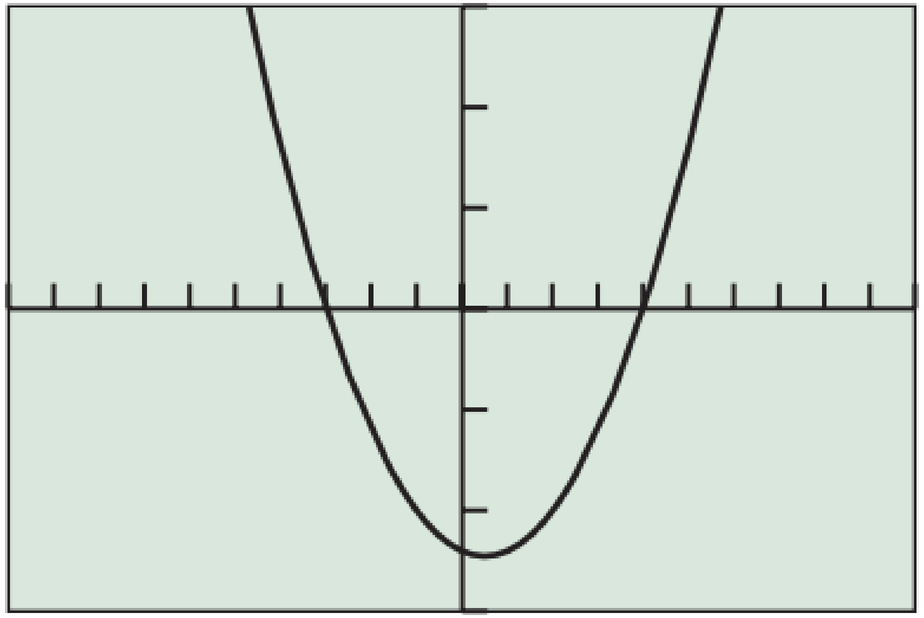


[–10, 10] by [–15, 15]

What if $x^2 - x - 12 < 0$



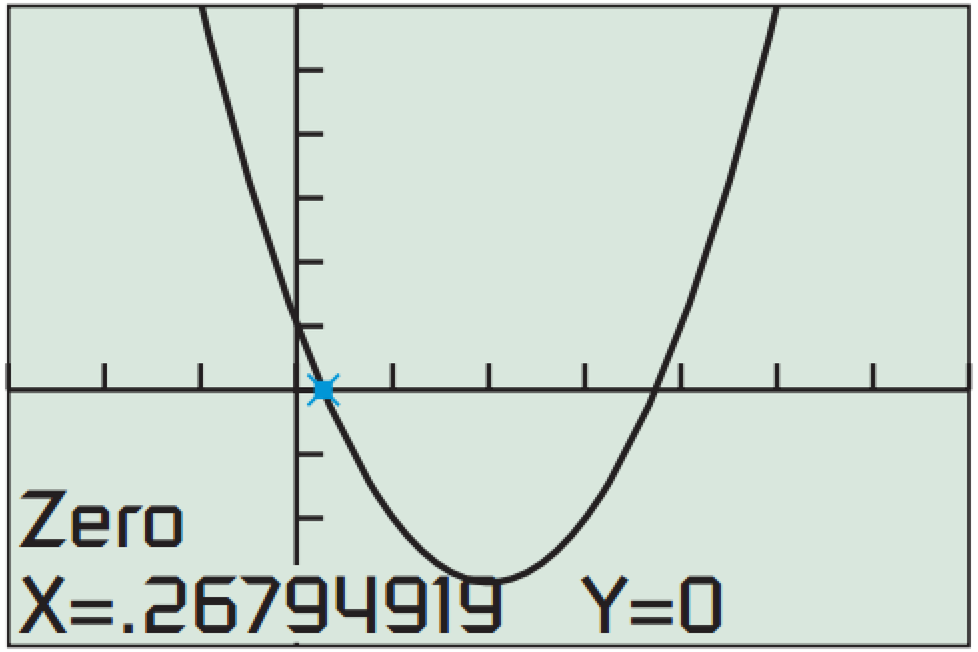
[–10, 10] by [–15, 15]

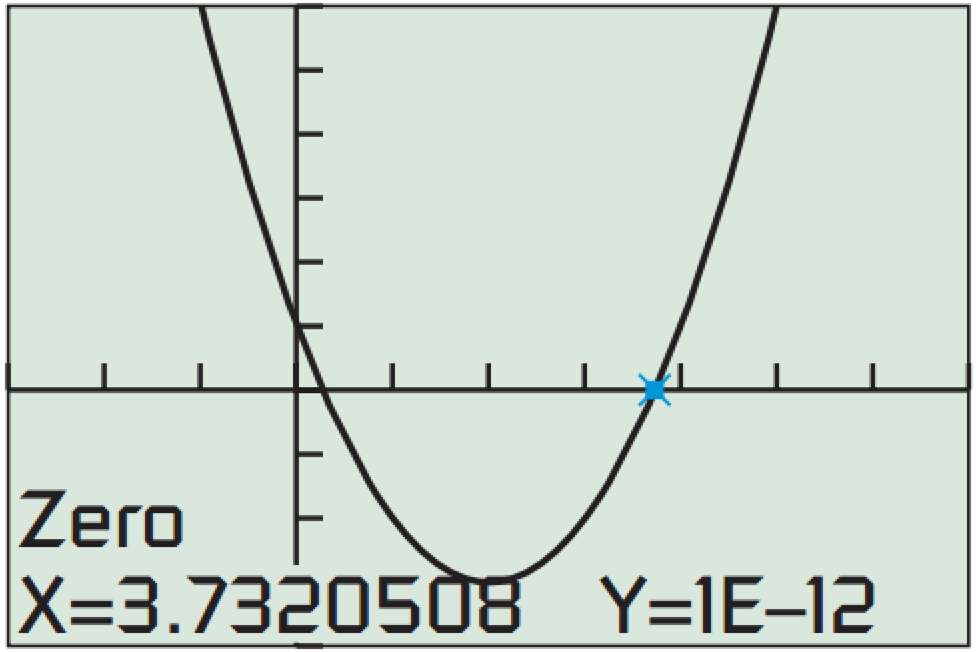
Solving Another Quadratic Inequality

Solve $2x^2 + 3x \leq 20$.

Solving a Quadratic Inequality Graphically

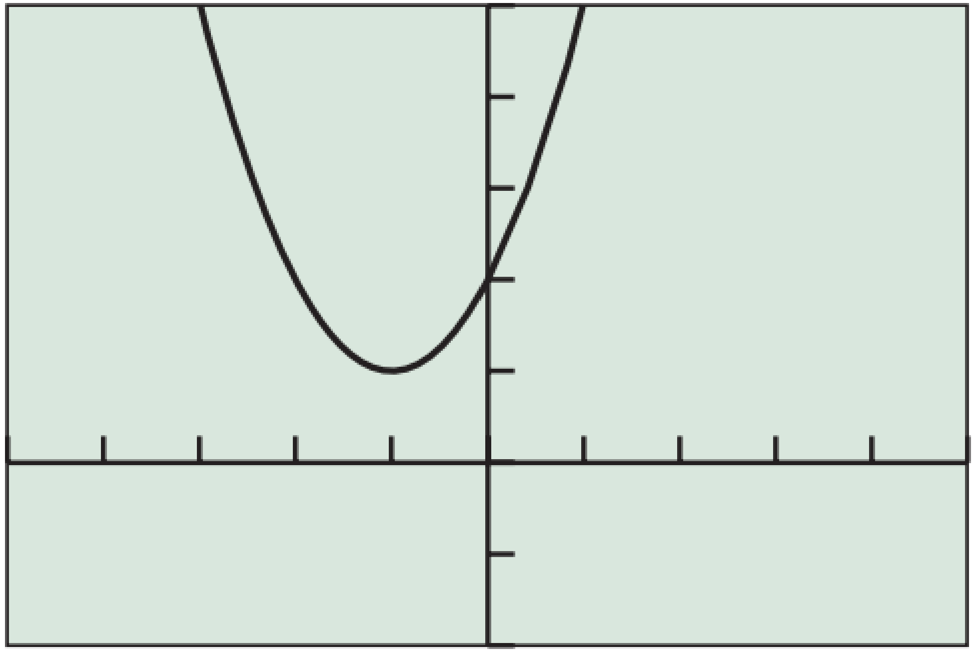
Solve $x^2 - 4x + 1 \geq 0$ graphically.





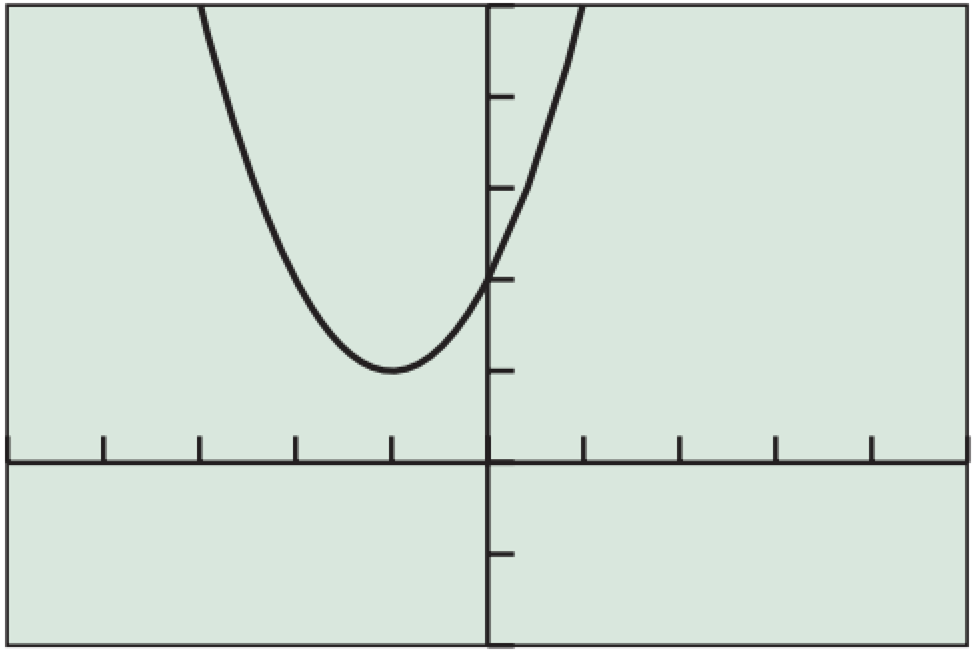
Showing that a Quadratic Inequality

Solve $x^2 + 2x + 2 < 0$.



[–5, 5] by [–2, 5]

What if $x^2 + 2x + 2 > 0$



[–5, 5] by [–2, 5]