

Method 1: Algebraically

Step 1: Find all the zeros of the function

Step 2: Plot the zeros on a number line. Remember to use a closed circle for \leq and \geq and an open circle for $<$ and $>$.

Step 3: Pick a test point in each interval

Step 4: Emphasize the intervals of the solution set on the number line by overshading.

Example 1: Solve $4x^2 + 17x < 42$

$$4x^2 + 17x - 42 < 0$$

$$x^2 + 17x - 168 < 0$$

$$\left(x - \frac{7}{4}\right)\left(x + \frac{24}{4}\right) < 0$$

$$(4x - 7)(x + 6) < 0$$

$$\begin{array}{r} -168 \\ -7 \times 24 \\ \hline 17 \end{array}$$

$$4x - 7 = 0$$

$$+7 \quad +7$$

$$4x = 7$$

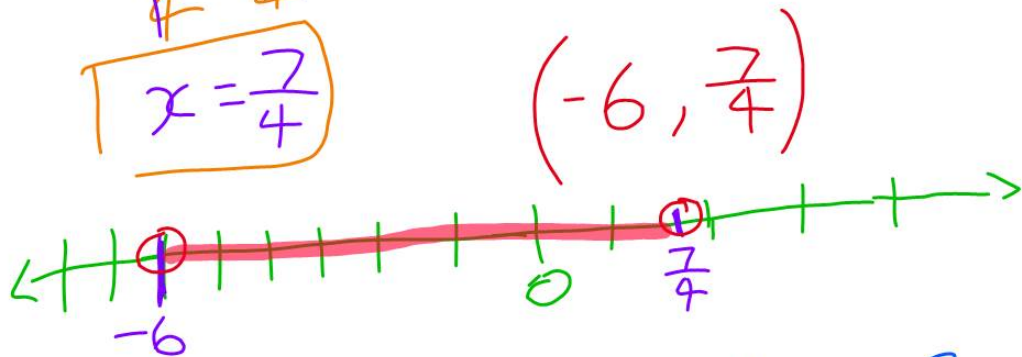
$$\frac{4x}{4} = \frac{7}{4}$$

$$x = \frac{7}{4}$$

$$x + 6 = 0$$

$$-6 \quad -6$$

$$x = -6$$



(chose -8)

$$4(-8)^2 + 17(-8) < 42$$

$$120 < 42$$

(chose -4)

$$4(-4)^2 + 17(-4) < 42$$

$$-4 < 42$$

(chose 2)

$$4(2)^2 + 17(2) < 42$$

$$50 < 42$$

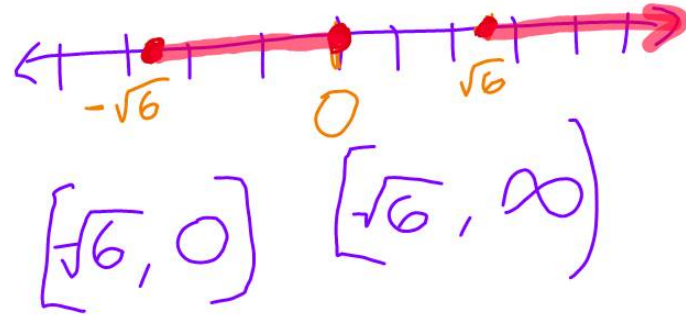
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Example 2: $x^3 - 6x \geq 0$

$$x(x^2 - 6) \geq 0$$

$$x = 0$$

$$x^2 - 6 = 0$$

$$+6 \quad +6$$

$$\sqrt{x^2} = \pm\sqrt{6}$$

$$x = \pm\sqrt{6}$$

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Example 3: $(x^3 - x^2 - 4x + 4) > 0$

$$x^2(x-1) - 4(x-1) > 0$$

$$(x^2 - 4)(x-1) > 0$$

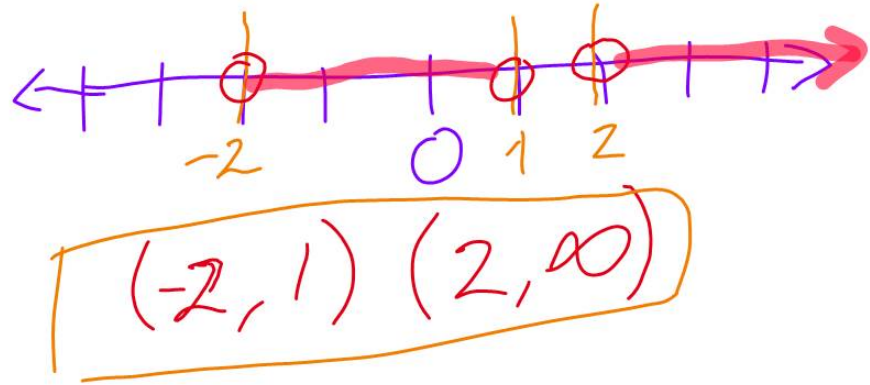
$$x^2 - 4 = 0$$
$$+4 \quad +4$$

$$\sqrt{x^2 \pm 4}$$

$$x = \pm 2$$

$$x - 1 = 0$$
$$+1 \quad +1$$

$$x = 1$$



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Example 4: $x^4 + 4x^3 \leq 12x^2$