\[(2a + 1) + (2b + 3)i = 4 - 7i\]

\[
\begin{align*}
2a + 1 &= 4 \\
\therefore 2a &= 3 \\
\therefore a &= \frac{3}{2}
\end{align*}
\]

\[
\begin{align*}
2b + 3 &= -7 \\
\therefore 2b &= -10 \\
\therefore b &= -5
\end{align*}
\]
\[(x+1)(x-1) \quad \left(\frac{2}{x^2-1} + \frac{1}{x+1} = 5\right) (x+1)(x-1)\]

\[2 + x - 1 = 5 (x^2 - 1)\]
\[x + 1 = 5x^2 - 5\]
\[0 = 5x - x - 6\]
\[0 = (5x-6)(x+1)\]
\[5x-6 = 0 \quad x+1 = 0\]
\[5x = 6 \quad x = -1\]
\[x = \frac{6}{5}\]
2.5 Solving Inequalities

Example 1 (Linear Inequalities)

Solve: \(3 \left(-4 \leq \frac{3-2x}{3} < 5\right)\)

\[-12 \leq 3 - 2x < 15\]
\[-15 \leq -2x < 12\]
\[\frac{-15}{-2} \geq x > -6\]
\[-6 < x \leq \frac{15}{2}\]
2.5 Solving Inequalities

Example 2 (Absolute Value Inequalities)

Solve: \(|2x - 15| \leq 3\)

\[-3 \leq 2x - 15 \leq 3\]

\[12 \leq 2x \leq 18\]

\[6 \leq x \leq 9\]
2.5 Solving Inequalities

Example 3 (Absolute Value Inequalities)

Solve: \(|x + 7| > 6\)

\[
\begin{align*}
x + 7 &< -6 \\
x &< -13 \\
(-\infty, -13) \cup (-1, \infty)
\end{align*}
\]
2.5 Solving Inequalities

Example 4 (Absolute Value Inequalities)

Solve: $|x^2 + 5x - 4| \leq 6$

$$-6 \leq x^2 + 5x - 4 \leq 6$$

$$\left| x^2 + 5x - 4 \right| - 6 \leq 0$$

$$[\text{-6.53, -4.4}] \cup [\text{-4.4, 1.53}]$$
2.5 Solving Inequalities

Example 5 (Absolute Value Inequalities)

Solve: \(|3x+1| < 5 - 2x\)

\[|3x+1| - 5 + 2x < 0\]

\((-6, .8)\)
2.5 Solving Inequalities

Example 6 (Polynomial and Fractional Inequalities – SIGN GRAPH)

Solve: $2x^3 + 5x^2 > 12x$

$2x^3 + 5x^2 - 12x > 0$

$x(2x^2 + 5x - 12) > 0$

$x(2x-3)(x+4) > 0$

$x = 0, \; \frac{3}{2}, \; -4$

$(-4, 0) \cup \left(\frac{3}{2}, \infty\right)$
\[ |x - 7| < 6 \]

\[-6 < x - 7 < 6 \]

\[1 < x < 13 \]

\[(1, 13)\]

\[ |\frac{x - 3}{2}| \geq 5 \]

\[\frac{x - 3}{2} \leq -5 \quad \frac{x - 3}{2} \geq 5 \]

\[x - 3 \leq -10 \quad x - 3 \geq 10 \]

\[x \leq -7 \quad x \geq 13 \]

\[(-\infty, -7] \cup [13, \infty)\]
2.5 Solving Inequalities

Example 7 (Polynomial and Fractional Inequalities – SIGN GRAPH)

Solve: $x^2 - 4x - 1 \leq 0$

The graph shows that the inequality is satisfied for $x$ in the interval $[-\frac{1}{4}, \frac{9}{4}]$. The solution set is $[-0.25, 2.25]$. 
2.5 Solving Inequalities

Example 8 (Polynomial and Fractional Inequalities – SIGN GRAPH)

TRY IT! Solve: \( x^3 - x^2 - 2x \geq 0 \)

\[
x(x^2 - x - 2) \geq 0
\]

\[
x(x-2)(x+1) \geq 0
\]

ANS: \([-1, 0] \cup [2, +\infty)\)
\[
\frac{x+1}{x+2} \geq 0
\]

Where \( f(x) = 0 \)

\[
x + 1 = 0
\]

\[
x = -1
\]

Where \( f(x) \) undefined.

\[
\begin{array}{c|ccc}
-3 & - & + \\
-1 & - & + \\
\end{array}
\]

\[
(-\infty, -2) \cup [-1, \infty)
\]
2.5 Solving Inequalities

Example 9 (Polynomial and Fractional Inequalities – SIGN GRAPH)

Solve: \[
\frac{x + 12}{x + 2} \geq 3
\]
2.5 Solving Inequalities

Example 10 (Domain Questions – AGAIN)

Find the domain of the function: \( f(x) = \sqrt{\frac{x-2}{x^2-9}} \)
Example 11 (Domain Questions – AGAIN)

Find the domain of the function: \( f(x) = \sqrt{2x^3 - 4x^4} \)