2.2. Linear Inequalities

Example (1). \(3x + 2 < 23\)

\[3x < 21\]
\[x < 7\]

There is an infinite number of solutions to this inequality.

Three different ways to indicate infinite sets.

1. Statement of inequality (set builder notation)

\[\{x \in \mathbb{R} : x < 7\}\]

"such that" 

real number and \(x\) is less than 7

2. Number line graph

between any two values on the number line, there is always an infinite number of points between them.

3. Interval notation

\((-\infty, 7)\)

always use parenthesis next to infinity

\((-\infty, \infty)\) BUT NEVER \([-\infty, a]\)
Hawkes Practice (1):

\[-41 < 5y - 1 \leq 29 \]
\[-40 < 5y \leq 30 \]
\[-8 < y \leq 6 \]

\[ \left\{ \begin{array}{c}
\rightarrow \\
-8 \\
6 \\
\Rightarrow \\
(-8, 6]
\end{array} \right. \]

So 6 is included in this set but -8 is not in this set.

Hawkes Practice (2):

\[ 7n - 9.8 < -8.4 + 6n \]
\[ n - 9.8 < -8.4 \]
\[ n < 1.4 \]

\[ \left\{ \begin{array}{c}
\rightarrow \\
1.4 \\
\Rightarrow \\
1.4
\end{array} \right. \]

*When solving inequalities, it is better to have the variable on the left side, so it's more natural to read and understand.*