Section 7.2

Graphing Linear Inequalities

These kinds of problems often come in a form like those shown below:

\[ 2x + y \leq 4 \]
\[ x > 3 \]
\[ y \leq 4 \]
\[ y > x \]

If we remove the inequality then each of these when graphed is just a line:

\[ 2x + y = 4 \]
\[ x = 3 \]
\[ y = 4 \]
\[ y = x \]

For example

\[ 2x + y = 4 \]
\[ y = -2x + 4 \]

Step 1
Remove your inequality which will make your graph a line and plot that line. If the inequality is $\geq$ or $\leq$ then your line is solid and if the inequality is $>$ or $<$ then your line is dotted or dashed.

So

\[
2x + y < 4 \\
2x + y = 4 \\
y = -2x + 4
\]

**Step 2**

Pick any point \((x, y)\) that you know does NOT live on your line. It does not matter which point just that the point is on one side or the other of the line.

In our case I will pick the point \((0, 0)\) or \((0, 2)\) and try that point in the original inequality.

\[
(0, 2) \\
x = 0, y = 2 \\
2x + y < 4 \\
2(0) + 2 < 4 \\
2 < 4
\]

Using this point game me a **TRUE** statement therefore you shade that whole side of the line.

\[
y < -2x + 4
\]
Example 2

\[ y \geq 4 \]

So replace the inequality

\[ y = 4 \]

Plot it with a solid line

Pick a point not on the line like \((0, 0)\)
\[(0, 0)\]
\[x = 0, y = 0\]
\[y \geq 4\]
\[0 \geq 4\]
which is FALSE so plot on the OTHER side of the line
\[y \geq 4\]