CHAPTER 7, SECTION 2

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Systems of Linear Inequalities

Method

- Graph the boundary line for each inequality

- Test a single point not on the boundary line (how about using $(0,0)$?) to determine which side of the boundary line (that is, which "half plane") is being described by the inequality

- The desired solution set is the set of points that belong to every one of these half planes

Example

$$\begin{aligned}
x &\geq 0 \\
y &\leq 3 \\
5x + 6y &\leq 30
\end{aligned}$$

Exercise #4

$$\begin{aligned}
x &\leq 3 \\
y &\geq -1 \\
2x + 5y &\leq 10
\end{aligned}$$

Example

Exercise #10

$$\begin{aligned}
3y + 2x + 12 &\geq 0 \\
x + 4 &\geq 0 \\
y + 2 &\geq 0 \\
y - 2 &\leq 0
\end{aligned}$$

Example

Exercise #21

A set of points is described by the inequalities

$$
\begin{aligned}
x &\geq 0 \\
x &\geq y \\
x &\leq y + 2 \\
3y + x &\leq 6
\end{aligned}
$$

Graph this set of points and find the vertices of the polygon that is described by the inequalities.

Example

Graph the feasible set, find the corner points, and evaluate the function p at the corner points for the following linear programming problem.

Minimize $\qquad\qquad p = x + 2y$

subject to

$$
\begin{aligned}
y - x &\leq 0 \\
y &\geq 0 \\
3x + 2y &\leq 6 \\
-x + 2y &\geq -1
\end{aligned}
$$