Quiz #5
Time: 10 minutes

Consider the function \( f(x, y) = y - 3x + 5 \), where \( x \) and \( y \) are subject to the constraints:

\[
\begin{align*}
&y - 2x \leq 1 \\
x + y \leq 4 \\
x \geq 0, \ y \geq 0 \\
\end{align*}
\]

(a) Draw the feasible region defined by the constraints. (b) Find the coordinates of the corners. (c) Find the maximum and minimum values of \( f \) on the feasible region.

(a) Inequalities (c) and (d) say that the feasible region is contained in the first quadrant.

For (a): the line is \( y - 2x = 1 \) or \( y = 2x + 1 \).

Use test point \((0,0)\) to find which half-plane to keep: \((0,0)\) satisfies the inequality, yes.

For (b): the line is \( x + y = 4 \) or \( y = -x + 4 \).

Use test point \((0,0)\): yes.

So the feasible region is the shaded polygon:

(b) We find the coordinates of the remaining corners by solving:

\[
\begin{align*}
y = 2x + 1 & \quad \rightarrow 2x + 1 = -x + 4 \\
y = -x + 4 & \quad \rightarrow 3x = 3, \ x = 1
\end{align*}
\]

\( x = 1 \) and \( y = 3 \).

(c) Evaluate \( f(x,y) \) at the 4 corners:

\( f(0,0) = 5, \ f(0,1) = 6, \ f(4,0) = -7, \ f(1,3) = 5 \)

This is the maximum. This is the minimum.