University of Utah
Math 1090, Fall 2009
Name: Key

Quiz #5
Time: 10 minutes

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

$$\begin{cases} y - 2x \leqslant 1 & \text{a} \\ x + y \leqslant 4 & \text{b} \\ x \geqslant 0, \; y \geqslant 0 & \text{c} \quad \text{d} \end{cases}$$

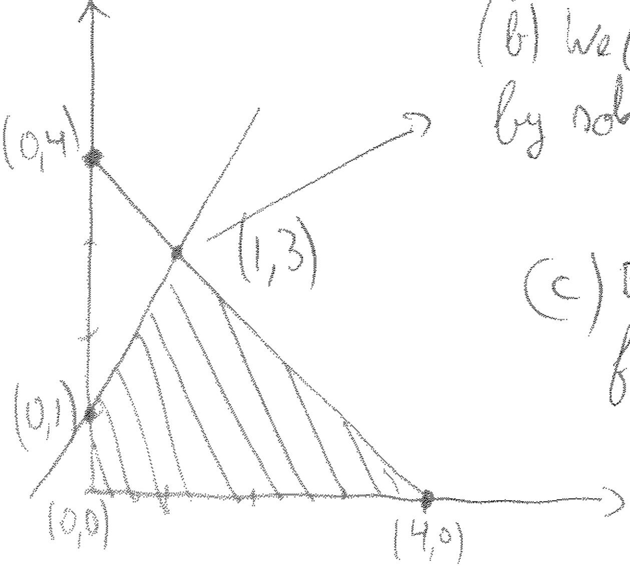
(a) Draw the feasible region defined by the constraints, (b) Find the coordinates of the corners
(c) Find the maximum and minimum values of f on the feasible region.

(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, so yes.
(y-intercept: $(0,1)$, x-int. $(-\frac{1}{2}, 0)$)

For b: the line is $x + y = 4$ or $y = -x + 4$
Use test point $(0,0)$: yes.
(y-intercept: $(0,4)$, x-intercept $(4,0)$)

So the feasible region is the shaded polygon:



(b) We find the coordinates of the remaining corner by solving:
$$\begin{cases} y = 2x + 1 \\ y = -x + 4 \end{cases} \longrightarrow 2x + 1 = -x + 4$$
so $3x = 3$, $\boxed{x = 1 \text{ and } y = 3}$

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

$f(0,0) = 5$, $\boxed{f(0,1) = 6}$, $\boxed{f(4,0) = -7}$, $f(1,3) = 5$

this is the maximum — this is the minimum