CS325 (Winter 2017) Quiz 5

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1. (6 pts) Turn the following optimization problem into a linear program.

$$\text{minimize } \max\{x_1, x_2, x_3\}$$

subject to

$$|x_1 + x_2 - x_3| \geq 5$$
$$x_1, x_2, x_3 \geq 0$$

minimize M

s.t. $x_1 \leq M$
$x_2 \leq M$
$x_3 \leq M$ } (4)

$(x_1 + x_2 - x_3) \geq 5$
$(x_1 + x_2 - x_3) \leq -5$ } (2)

$x_1, x_2, x_3 \geq 0$

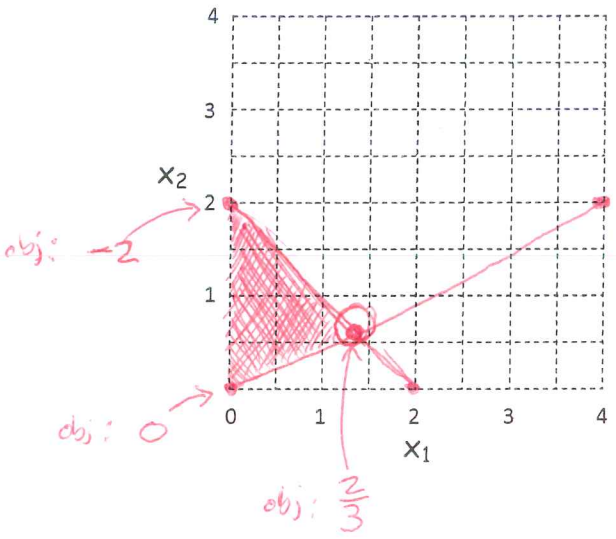
2. Consider the following linear program.

$$\text{maximize } x_1 - x_2$$

subject to

$$x_1 + x_2 \leq 2$$
$$x_1 - 2x_2 \leq 0$$
$$x_1, x_2 \geq 0$$

- (5 pts) Graph the feasible region on the grids provided below. Please shade the feasible region.
- (4 pts) Identify the optimal objective value and the (x_1, x_2) that achieves it.



(5) for the plot, shaded region.

- $x_1 - 2x_2 = x_1 + x_2 - 2$

  $-3x_2 = -2 \Rightarrow x_2 = \frac{2}{3}$

- $x_1 + x_2 - 2 = 0$

  $x_1 + \frac{2}{3} - 2 = 0$

  $x_1 - \frac{4}{3} = 0 \Rightarrow x_1 = \frac{4}{3}$

$x_1 = \frac{4}{3}$, $x_2 = \frac{2}{3}$

objective: $x_1 - x_2 = \frac{4}{3} - \frac{2}{3} = \frac{2}{3}$

(4)