1. $z = 3x_1 + 2x_2$

subject to: $2x_1 + 3x_2 \le 6$

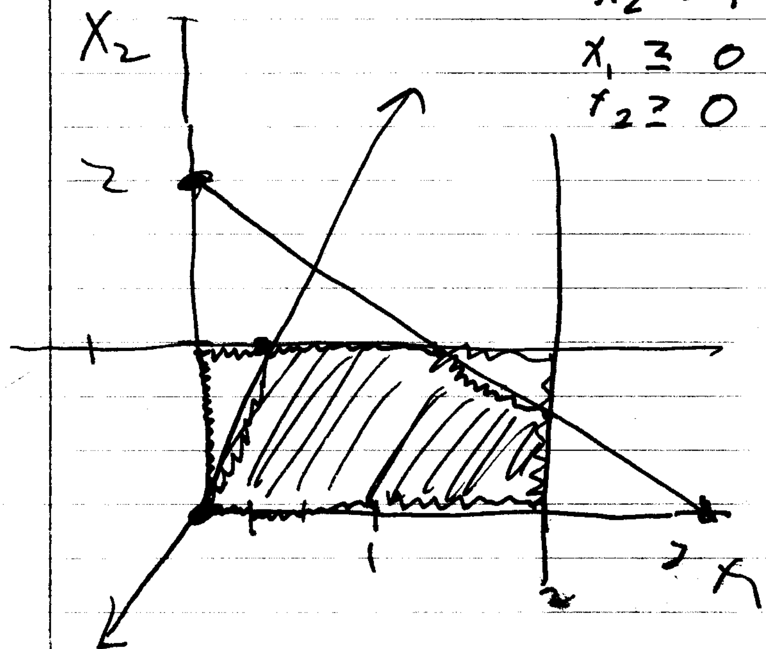
$3x_1 - x_2 \ge 0$

$x_1 \le 2$

$x_2 \le 1$

$x_1 \ge 0$

$x_2 \ge 0$



graph to find feasible region ←

points: $(0,0)$, $(1,3)$, $(\frac{3}{2}, 1)$, $(2, \frac{4}{3})$

$z =$ 0, 9, $\frac{13}{2}$, $\boxed{\frac{26}{3}}$ ← max

2. min $z = 3x_1 - 5$

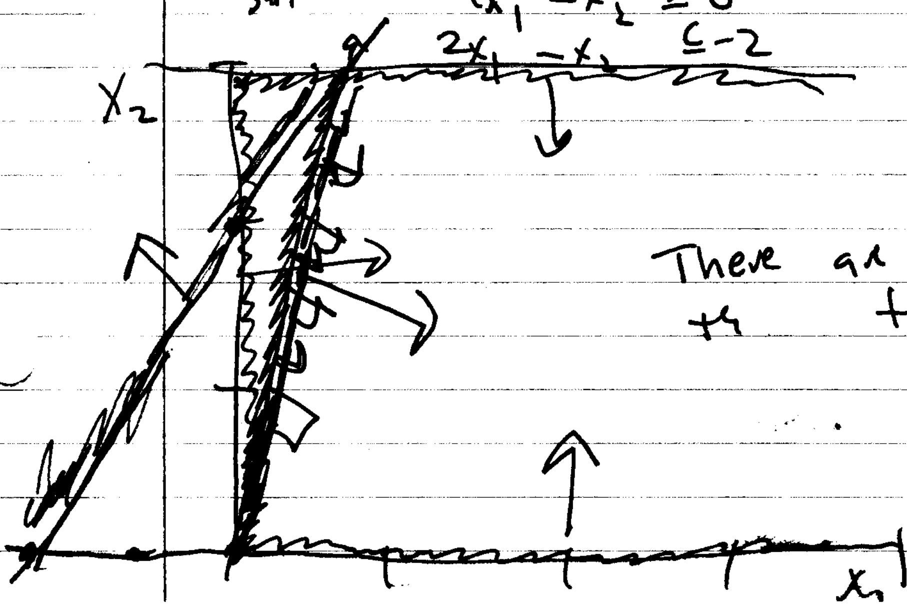
s.t. $4x_1 - x_2 \ge 0$

$2x_1 - x_2 \le -2$

$x_2 \le 3$

$x_1 \ge 0$

$x_2 \ge 0$



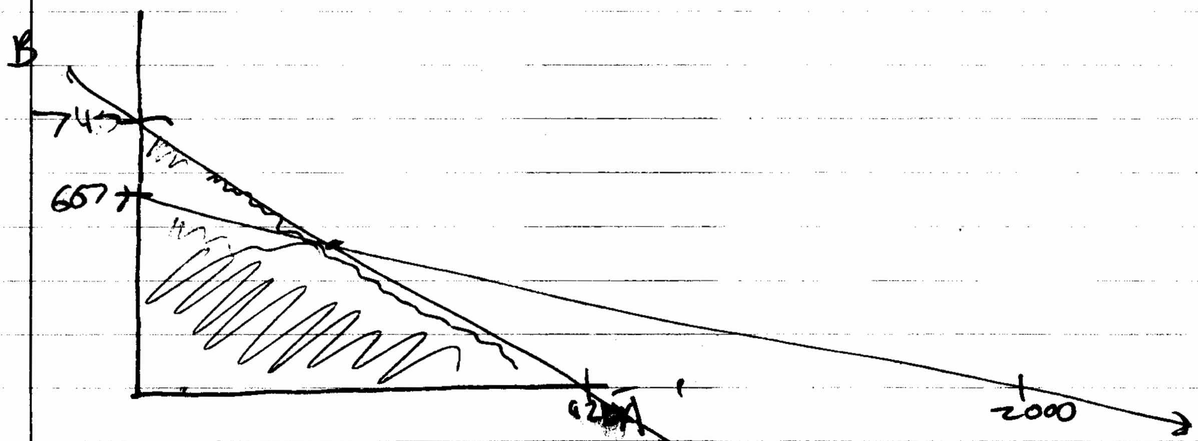
There are no points in the feasable region.

3. So, want to max:

$$Z = 2.2A + 3B$$

st $40A + 50B \le 37{,}000$ $\quad A \ge 0$

$2A + 3B \le 2{,}000$ $\quad B \ge 0$



(0,0) → z → 0

(0, 667) → 2001

(925, 0) → 2035

$\boxed{(550, 300) \to 2110}$

4. $Z = 2.5A + 3B$ Feasible region (and possible points) are the same.

(0,0) → z → 0

(0, 667) → 2001

(925, 0) → 2312

(550, 300) → 2275

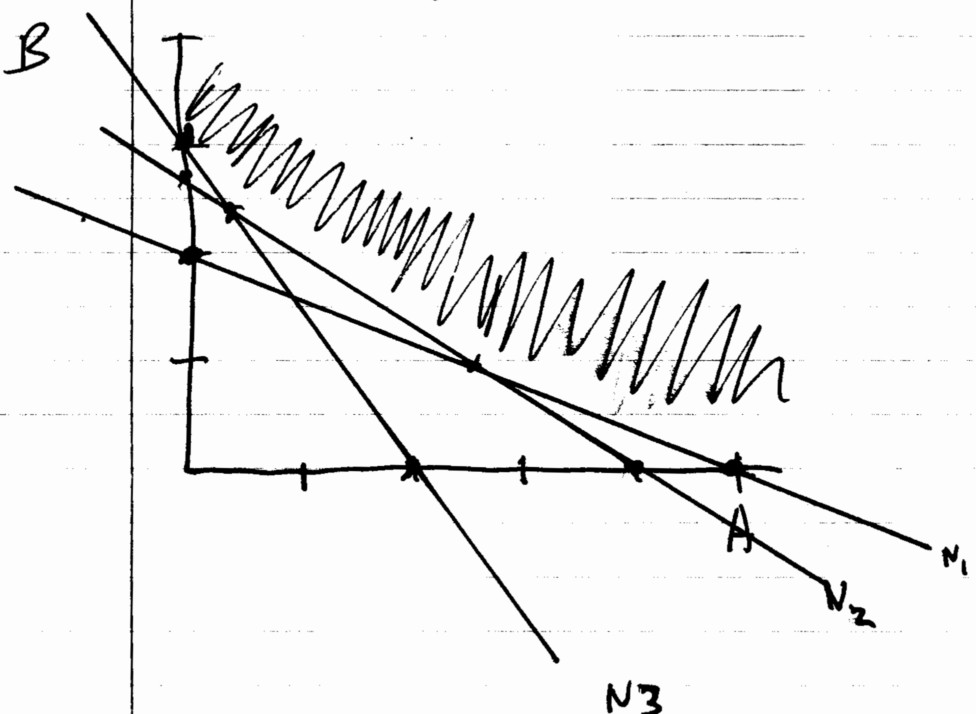
~~4~~

5. $\min z = 8A + 9B$

N_1:

$$2A + 5B \geq 10$$
$$2A + 3B \geq 8$$
$$6A + 4B \geq 12$$

$$A, B \geq 0$$



$(0, 3)$, $\boxed{(2/5,\ 12/5)}$, $(5/2, 1)$, $(5, 0)$

$\downarrow$ 27, $\boxed{24.8}$, 29, 40

We have two points that satisfy the ~~equal~~ constraint, (x_1, y_1) and (x_2, y_2)

The line between them must be in the set: ~~#~~ the set is convex.

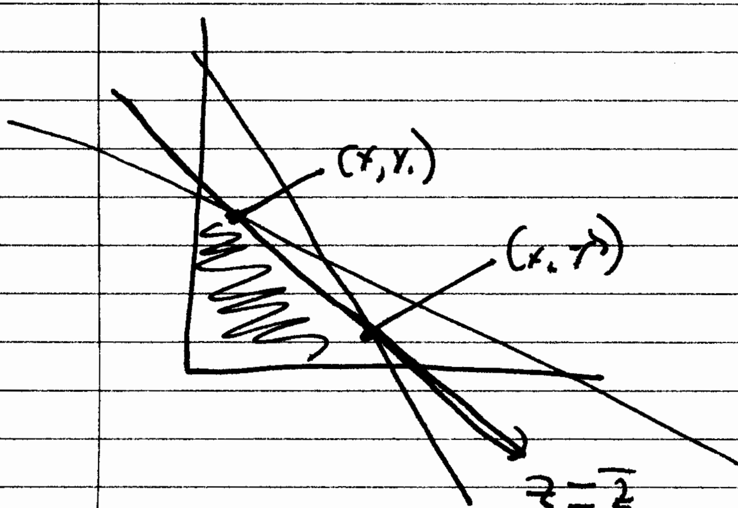
~~&~~ and, the line between them ~~has~~ has the same value

$$z = a x_1 + b y_1$$
$$z = a x_2 + b y_2$$

$$z = a(x_1 - x_2) + b(y_1 - y_2) + z$$

Which is a line through (x_1, y_1) and (x_2, y_2), whose value is everywhere z.

more visually:



if they have the same value, the line between the must be a line where $z = \bar{z}$ for all points.