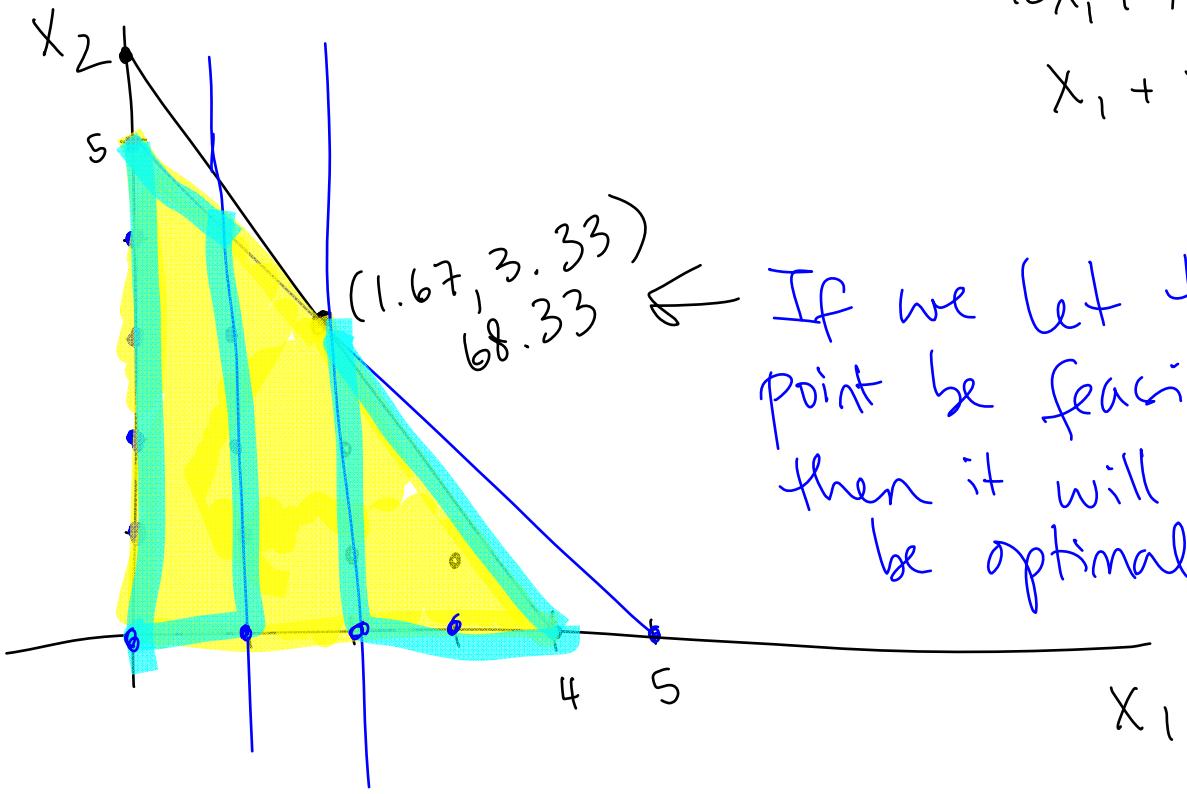
$10x_1 + 7x_2 \leq 40$

$x_1 + x_2 \leq 5$



If we let this point be feasible, then it will always be optimal.

New problems:

max $17x_1 + 12x_2$

s.t. $10x_1 + 7x_2 \leq 40$

$x_1 + x_2 \leq 5$

$x_1, x_2 \geq 0$

$x_1 \leq 1$

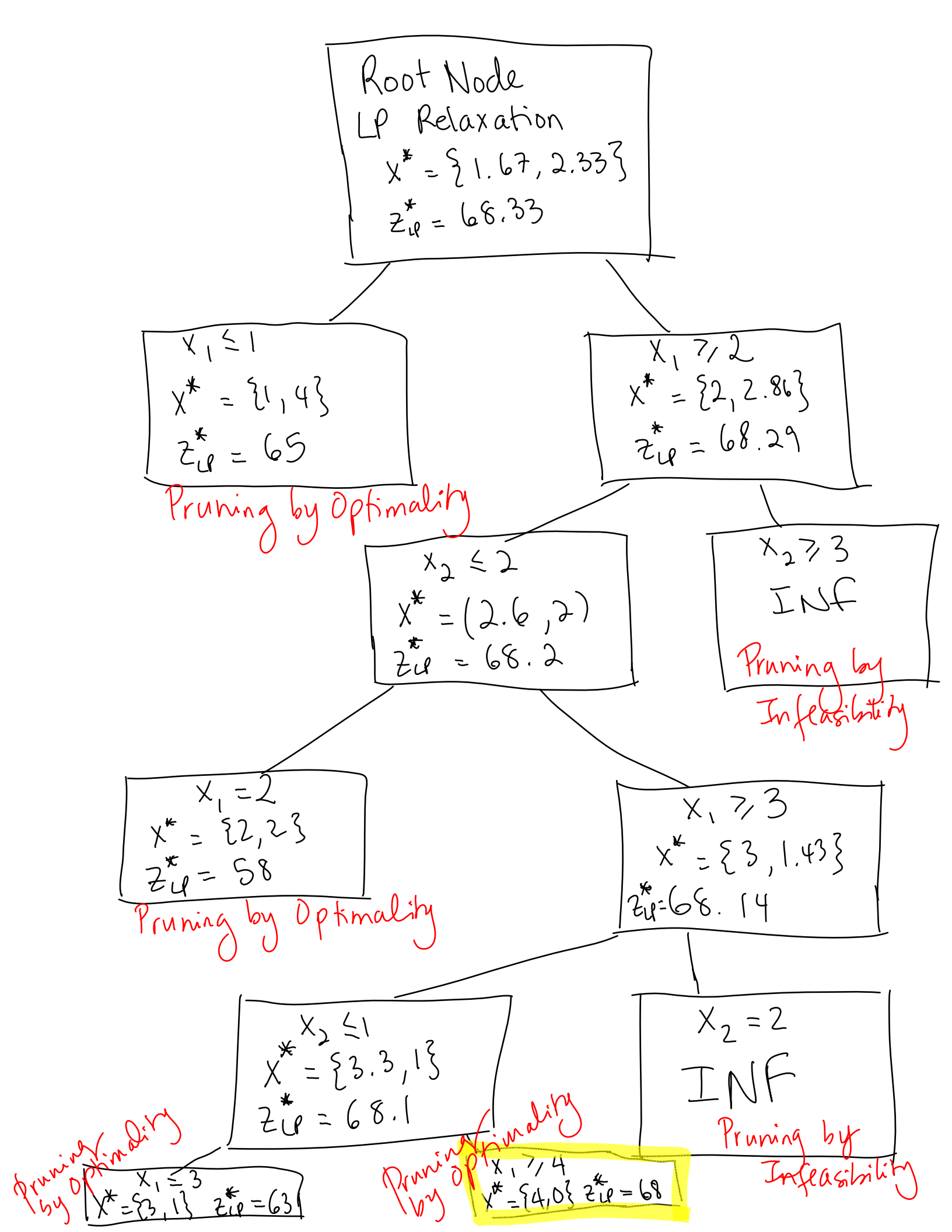
max $17x_1 + 12x_2$

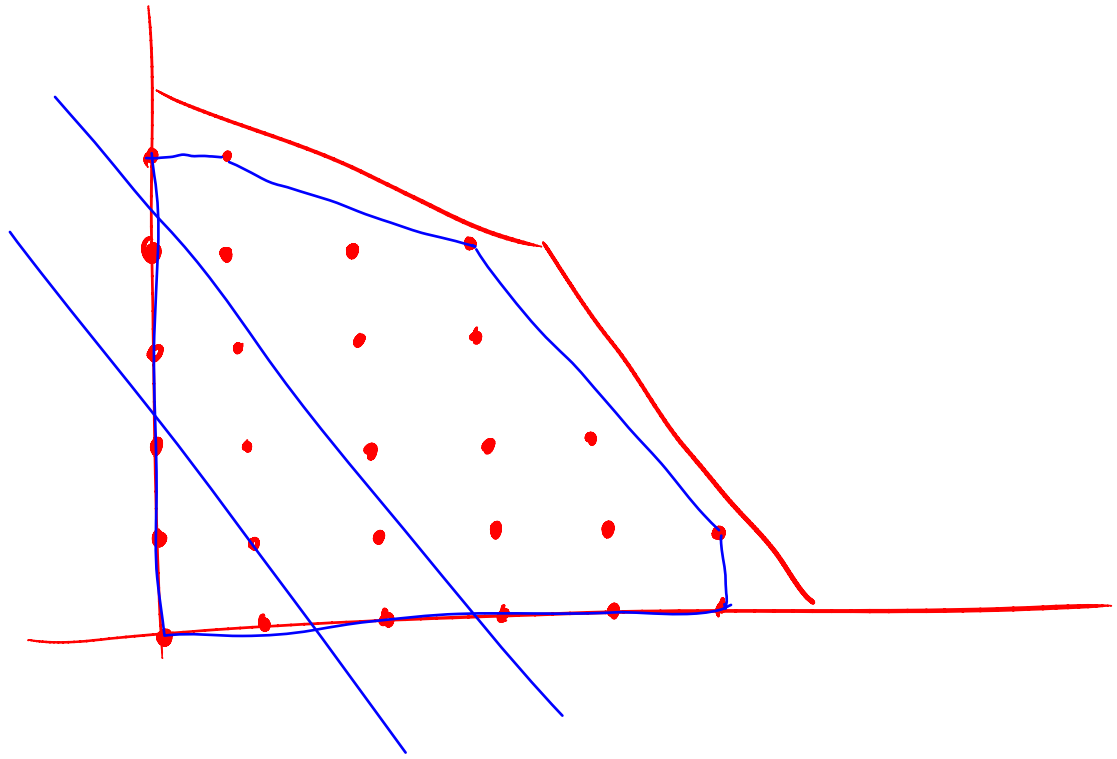
s.t. $10x_1 + 7x_2 \leq 40$

$x_1 + x_2 \leq 5$

$x_1, x_2 \geq 0$

$x_1 \geq 2$


Root Node
LP Relaxation
$x^* = \{1.67, 2.33\}$
$z^*_{LP} = 68.33$
$x_1 \leq 1$
$x^* = \{1, 4\}$
$z^*_{LP} = 65$
Pruning by Optimality
$x_1 \geq 2$
$x^* = \{2, 2.86\}$
$z^*_{LP} = 68.29$
$x_2 \leq 2$
$x^* = (2.6, 2)$
$z^*_{LP} = 68.2$
$x_2 \geq 3$
INF
Pruning by Infeasibility
$x_1 = 2$
$x^* = \{2, 2\}$
$z^*_{LP} = 58$
Pruning by Optimality
$x_1 \geq 3$
$x^* = \{3, 1.43\}$
$z^*_{LP} = 68.14$
$x_2 \leq 1$
$x^* = \{3.3, 1\}$
$z^*_{LP} = 68.1$
$x_2 = 2$
INF
Pruning by Infeasibility
$x_1 \leq 3$
$x^* = \{3, 1\}$ $z^*_{LP} = 63$
Pruning by Optimality
$x_1 \geq 4$
$x^* = \{4, 0\}$ $z^*_{LP} = 68$
Pruning by Optimality



① $3x_1 + 4x_2 + 5x_3 + 2x_4 \leq 7$

$x \in \{0,1\}^4$

$x_1 + x_3 \leq 1$

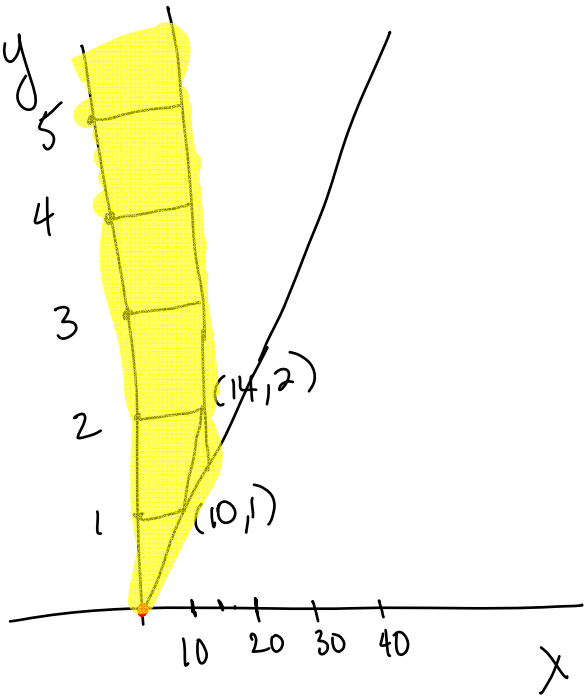
$x_2 + x_3 \leq 1$

② $\left.\begin{array}{l} x \leq 9999y \\ 0 \leq x \leq 5 \\ y \in \{0,1\} \end{array}\right\} \Rightarrow x \leq 5y$

③ $x \le 10y$

$0 \le x \le 14$

$y \in \mathbb{Z}_+$



$x \le 6 + 4y$

④ $13x_1 + 20x_2 + 11x_3 + 6x_4 \ge 72$

Pick x_3: $\frac{13}{11}x_1 + \frac{20}{11}x_2 + x_3 + \frac{6}{11}x_4 \ge \frac{72}{11}$

b/c $x \ge 0$ $2x_1 + 2x_2 + x_3 + x_4 \ge \frac{13}{11}x_1 + \frac{20}{11}x_2 + x_3 + \frac{6}{11}x_4 \ge \frac{72}{11}$

$2x_1 + 2x_2 + x_3 + x_4 \ge 6\frac{6}{11}$) b/c x's are integer

$2x_1 + 2x_2 + x_3 + x_4 \ge 7$

$\sum_j u^T a_j x_j \le u^T b \Rightarrow \sum_j \lfloor u^T a_j \rfloor x_j \le u^T b$ b/c $x \ge 0$

$\sum_j \lfloor u^T a_j \rfloor x_j \le \lfloor u^T b \rfloor$ b/c x int

(1) Start with a problem of the form

$$\begin{aligned} \max \quad & c^T x \\ \text{s.t.} \quad & Ax \leq b \\ & x \geq 0 \end{aligned}$$

Enter coefficients as is.

(2) Until all the positive coefficients in the objective function are gone, do:

(a) Pick the column with the largest positive coefficient in the objective function

(b) Look down the column for positive coefficients.

(c) Pick the one with the smallest constant/coefficient ratio

(d) Pivot.

(3) All (nonbasic) variables on the right-hand side = 0

All (basic) variables on the left hand side = constants.