

10/12/12

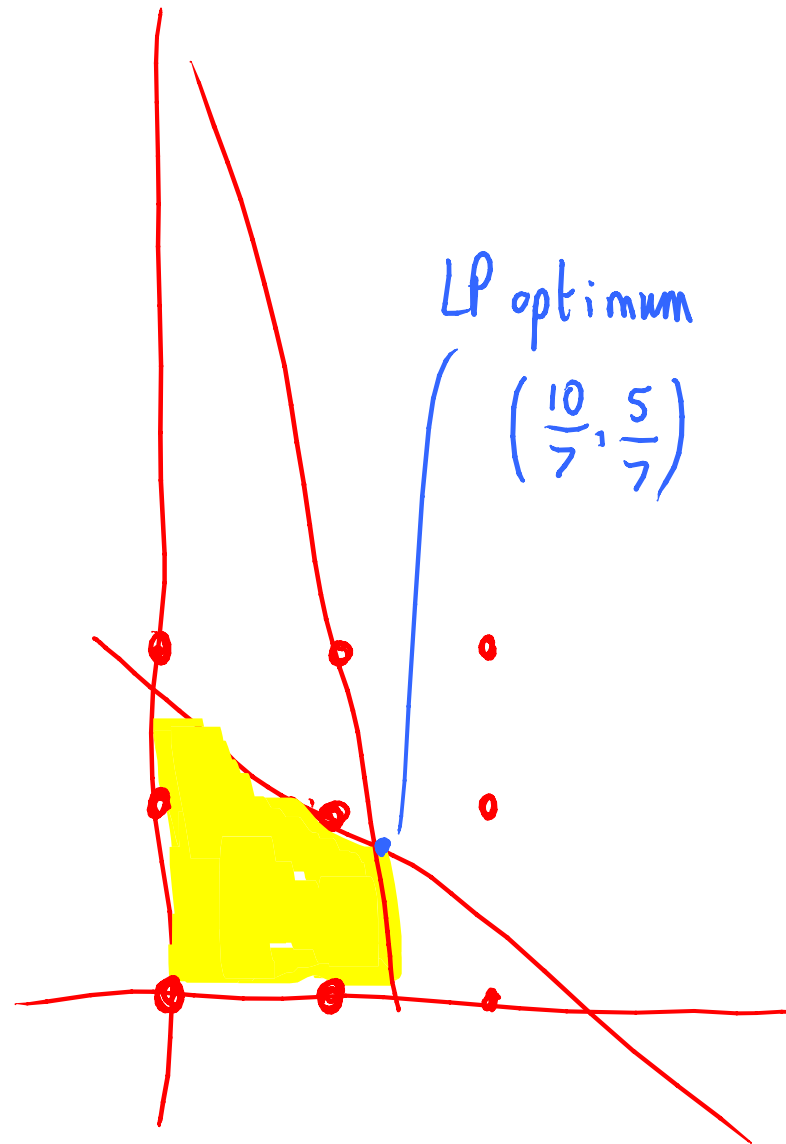
Branch & bound

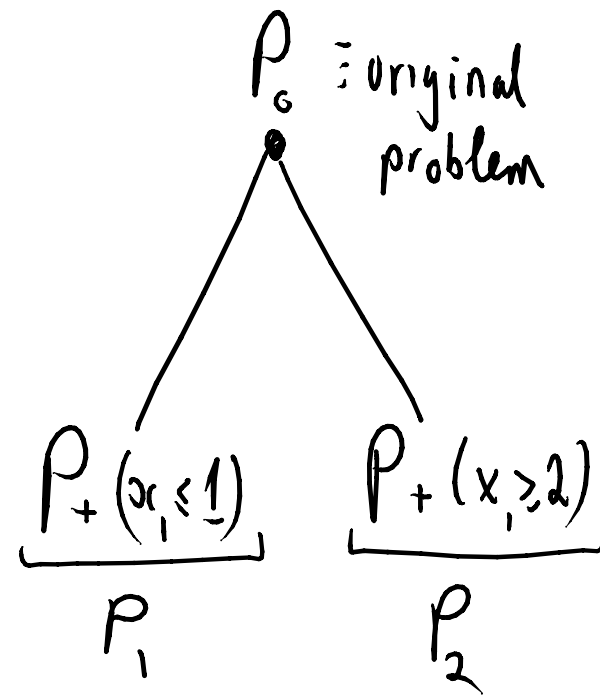
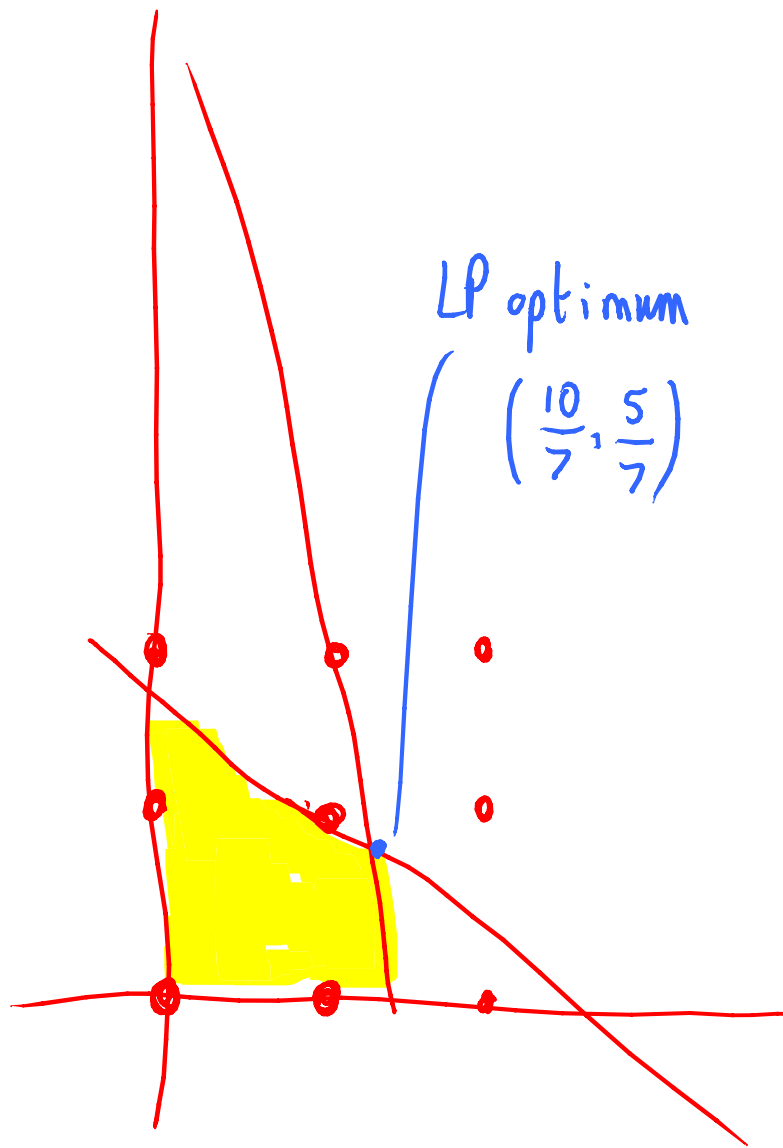
Maximise $3x_1 + 4x_2$

$$2x_1 + 3x_2 \leq 5$$

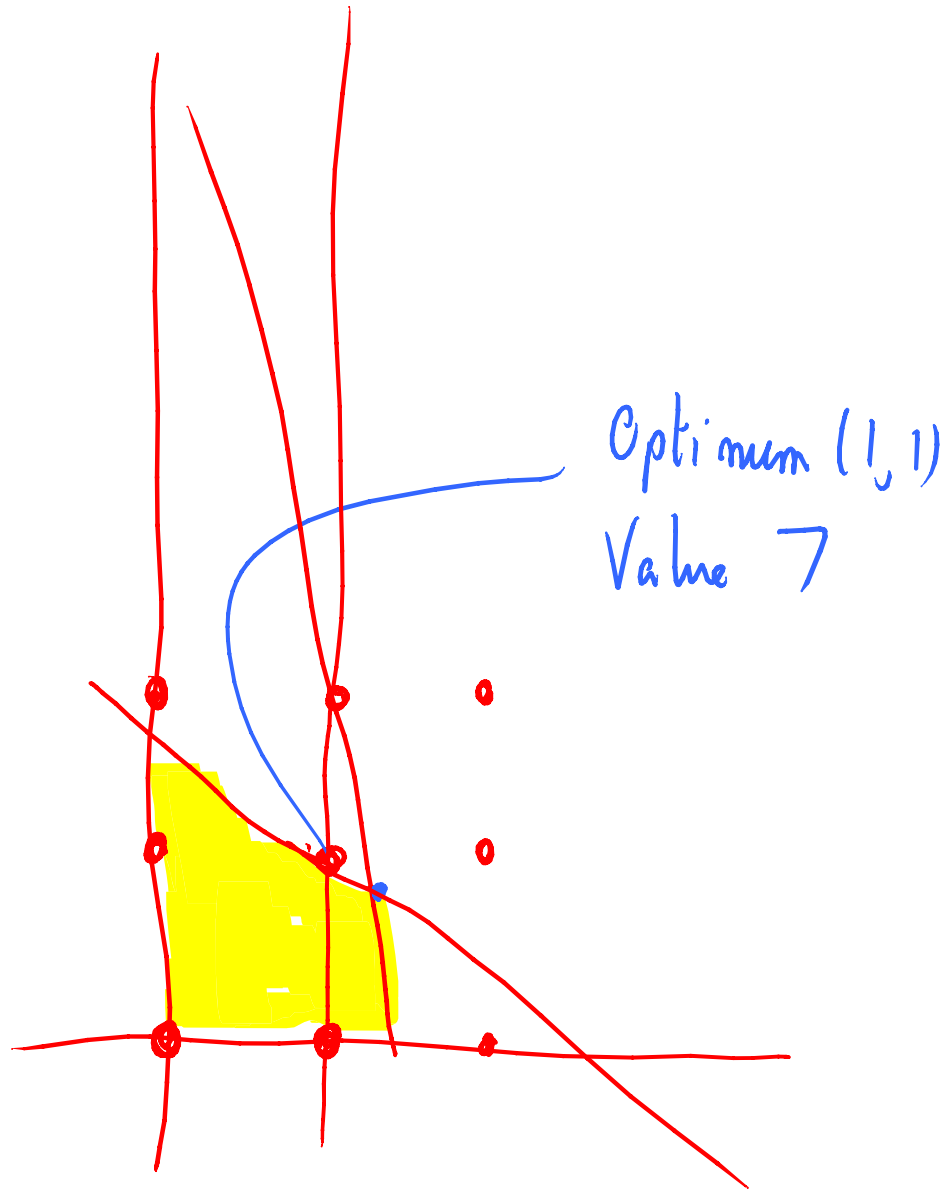
$$4x_1 - x_2 \geq 0$$

$0 \leq x_1, x_2$
Integers



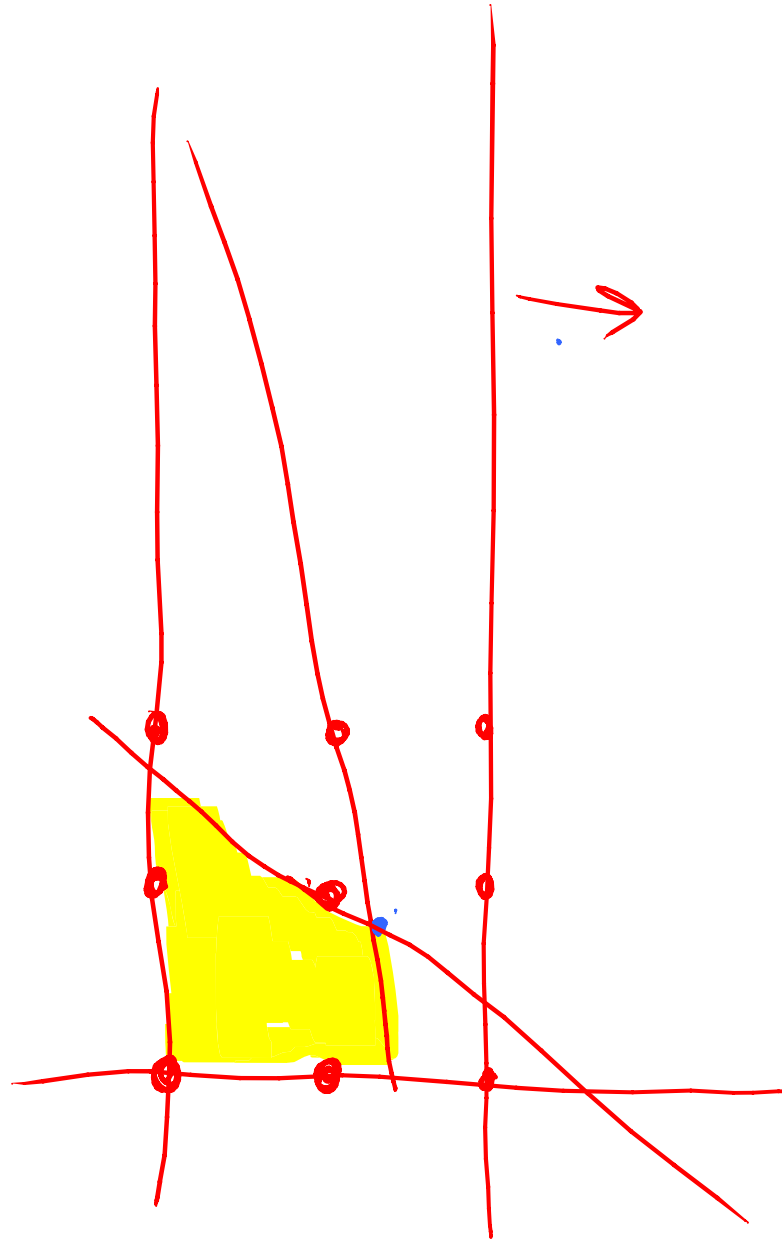


P₁

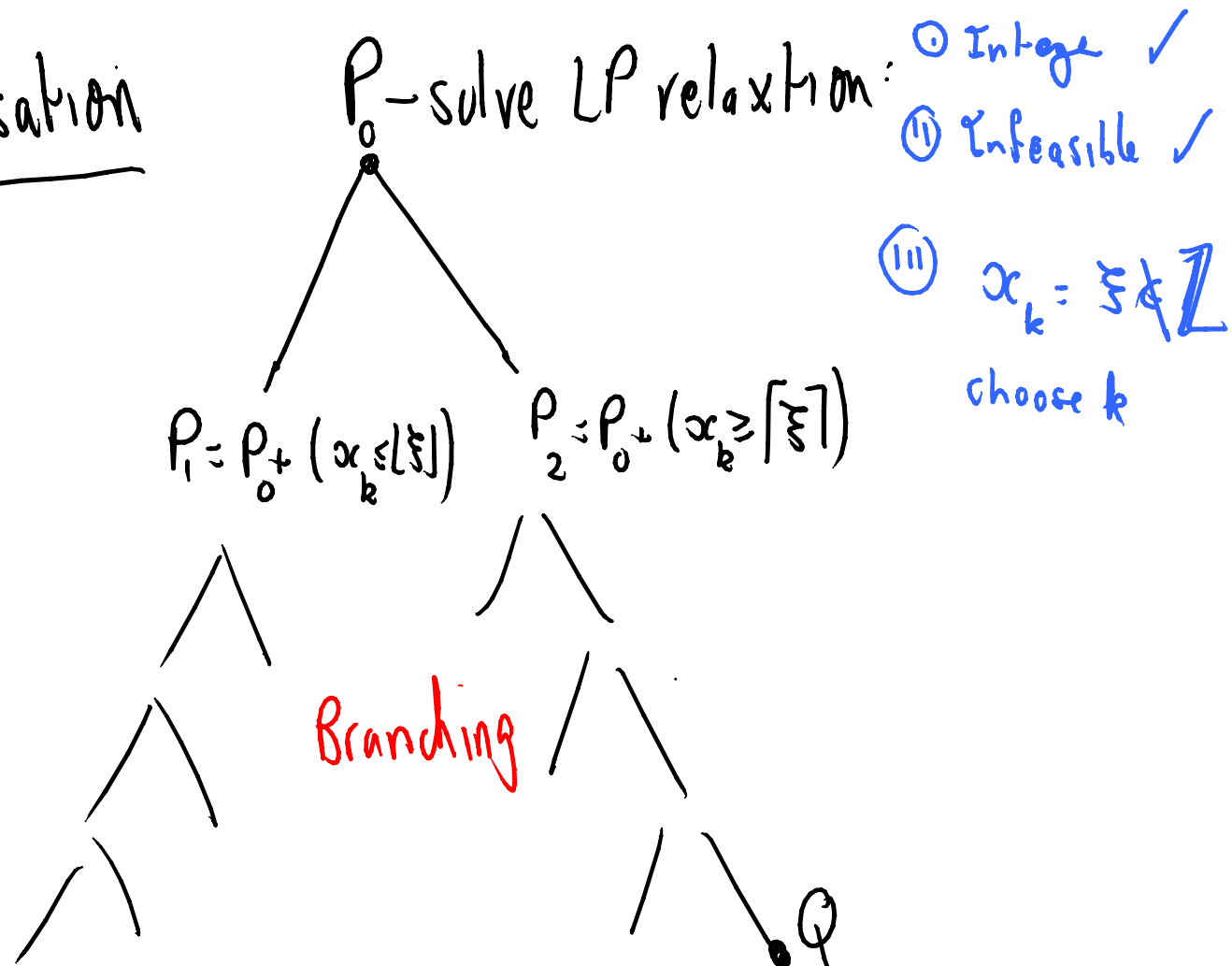


p2

Infeasible



Maximisation

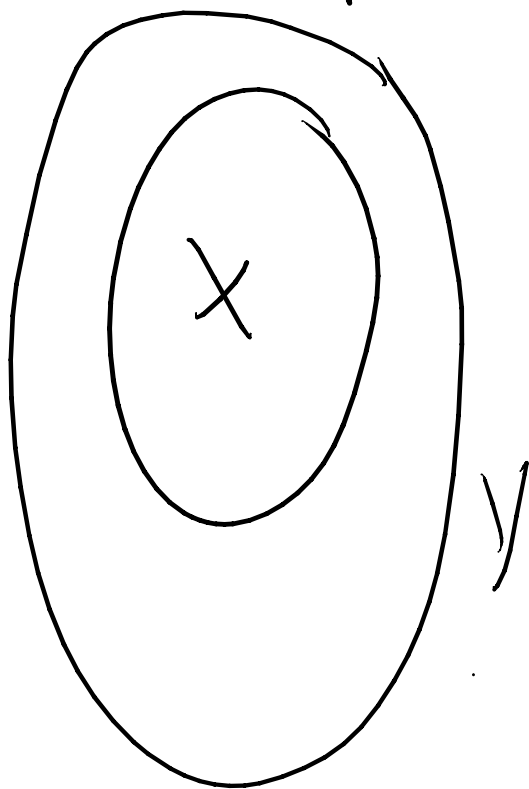


Suppose we
have a feasible solution
of value Z

Suppose optimal LP value of $Q \leq Z$. ✓

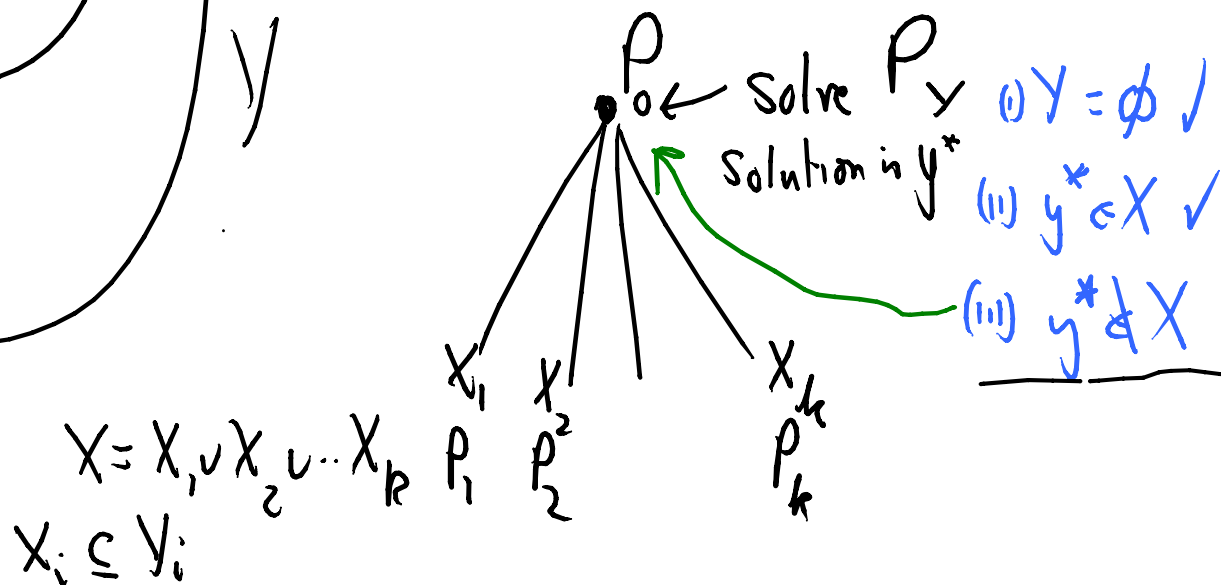
General Approach.

Suppose problem $P_X \equiv \text{maximise } f(x), x \in X$.



Suppose it is easy to solve

$\text{maximise } f(x) : x \in Y$



Implicit Enumeration

$$\text{Maximize } 5x_1 + 4x_2 + 3x_3 - x_4 + 3x_5$$

s.t.

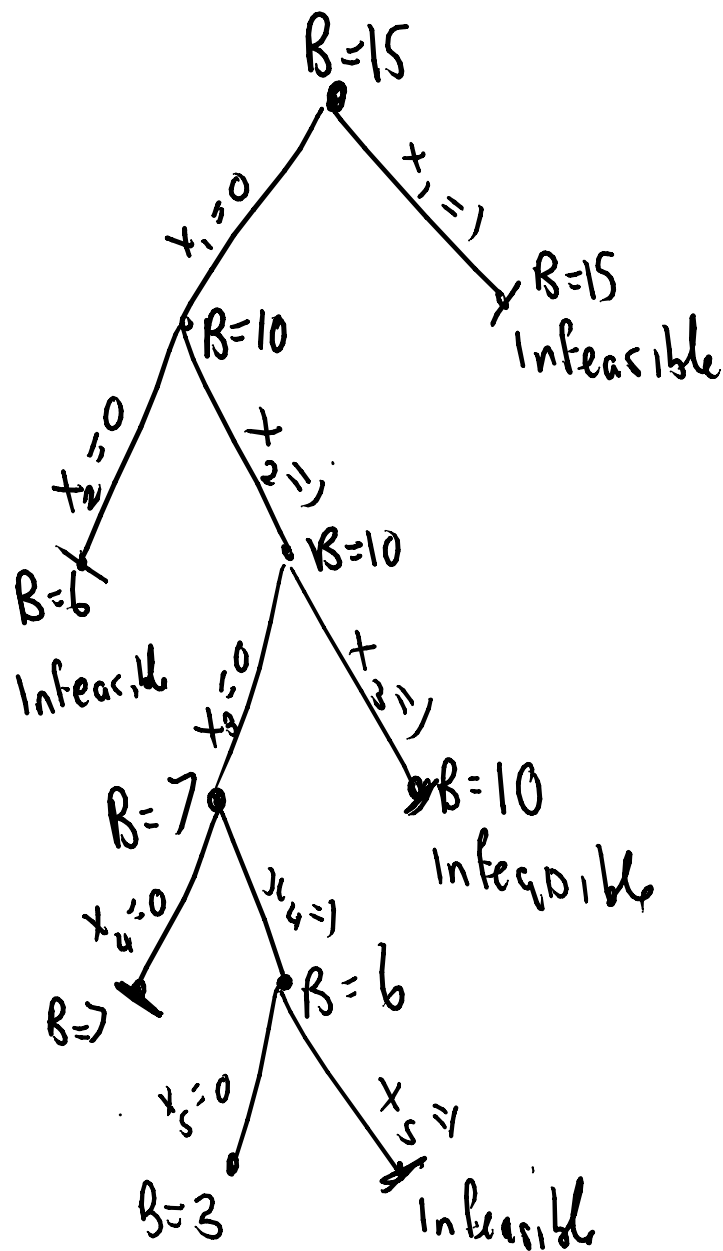
$$x_1 + 2x_2 + 3x_3 - 2x_4 + x_5 \leq 4$$

$$-x_1 + x_2 - x_3 + x_4 - x_5 \geq 2$$

$$2x_1 - x_2 + x_3 - x_4 + x_5 \leq 3$$

$$x_j = 0 \text{ or } 1$$

Bound B



Maximize $5x_1 + 4x_2 + 3x_3 - x_4 + 3x_5$
 st.

$$x_1 + 2x_2 + 3x_3 - 2x_4 + x_5 \leq 4$$

$$-x_1 + x_2 - x_3 + x_4 - x_5 \geq 2$$

$$2x_1 - x_2 + x_3 - x_4 + x_5 \leq 3$$

$x_j = 0 \text{ or } 1$

$x_j = 0 \text{ or } 1$

Answer: $0, 1, 0, 1, 0$

$$\text{Bound} = \sum \max\{0, c_i\}$$

Check each constraint individually to see if satisfying constraint is possible, ignoring other constraints.