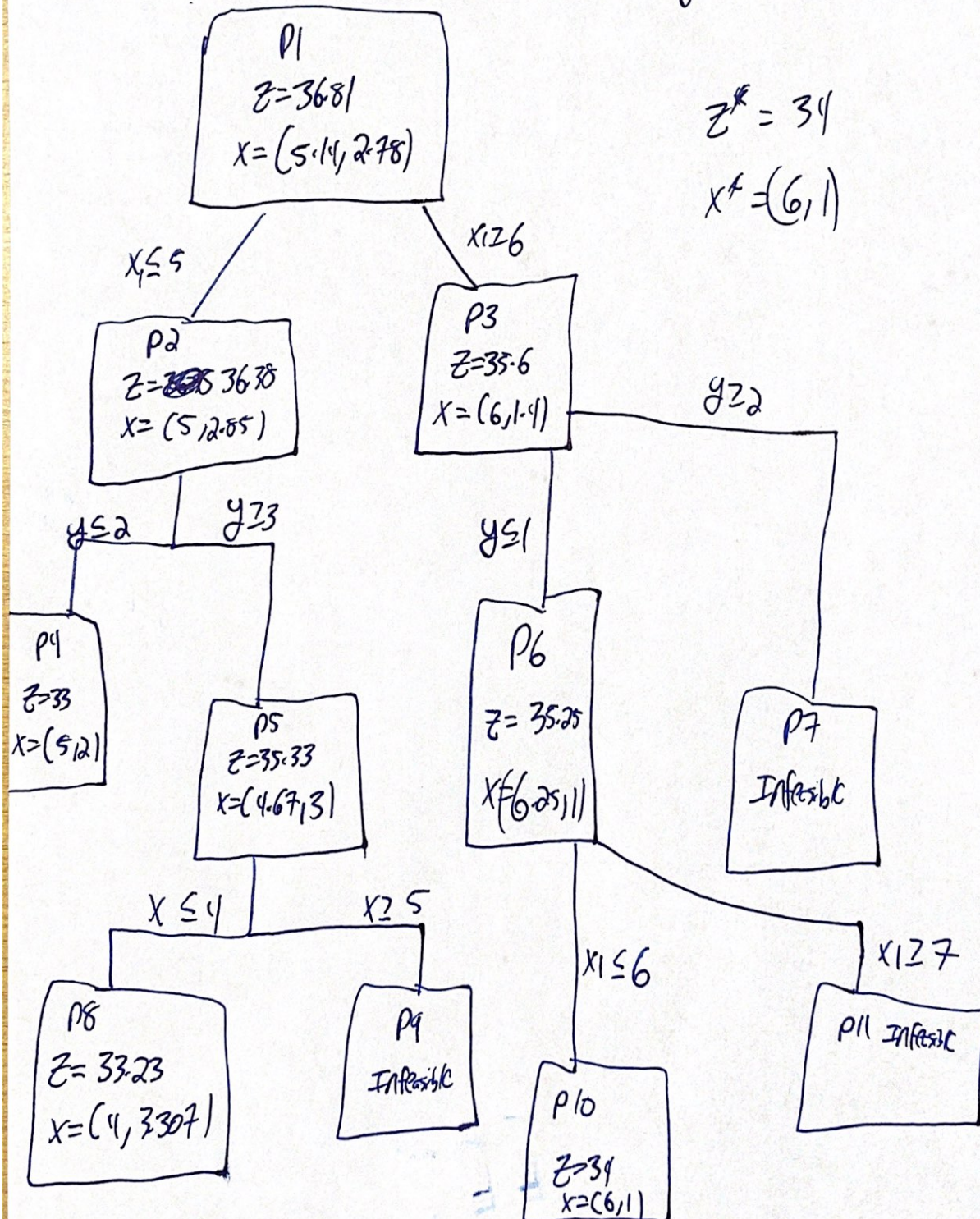


# HW 7 Solution

①

1) Tree is below, explanation on next page

let  $y = x_2$





(2)

Step 1: Initialization

$$Z_{IP} \leq 3681$$

Branch on  $x_1$

Step 2: solve  $P_2$  and  $P_3$ . Branch on  $P_2$  b/c  $Z_{P2} > Z_{P3}$

Step 3: Solve  $P_4$  and  $P_5$ .  $P_4$  becomes incumbent solution. Branch on  $P_3$  because  $Z_{P3} > Z_{P5}$

Step 4: Solve  $P_6$  and  $P_7$ . Fathom  $P_7$  because its infeasible. Branch on  $P_5$  because  $Z_{P5} > Z_{P6}$

Step 5: solve  $P_8$  and  $P_9$ . Eliminate  $P_9$  because infeasible.

Branch on  $P_6$  because  $Z_{P6} > Z_{P8}$

Step 6: solve  $P_{10}$  and  $P_{11}$ . Fathom  $P_{11}$  b/c

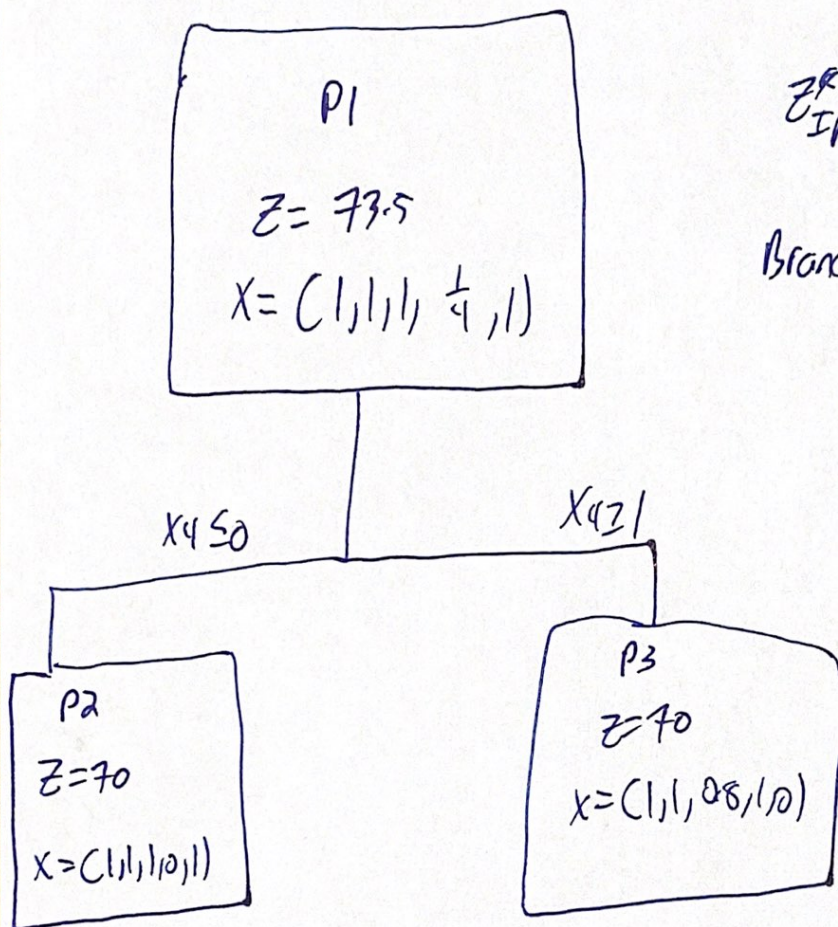
infeasible.  $Z_{P10} > Z_{P4}$ , so  $P_{10}$  becomes our current solution. Fathom  $P_4$ . Also  $34 > Z_{P8}$

So fathom  $P_8$ . No active nodes left. Done.



2) (Note this one is too easy)

③



$$Z_{IP}^* \leq 73.5$$

Branch on  $x_4$

$$Z_{IP}^* \geq 70$$

Can fathom  $P_3$   
because we'll never  
get a solution  
better than 70

So we're done

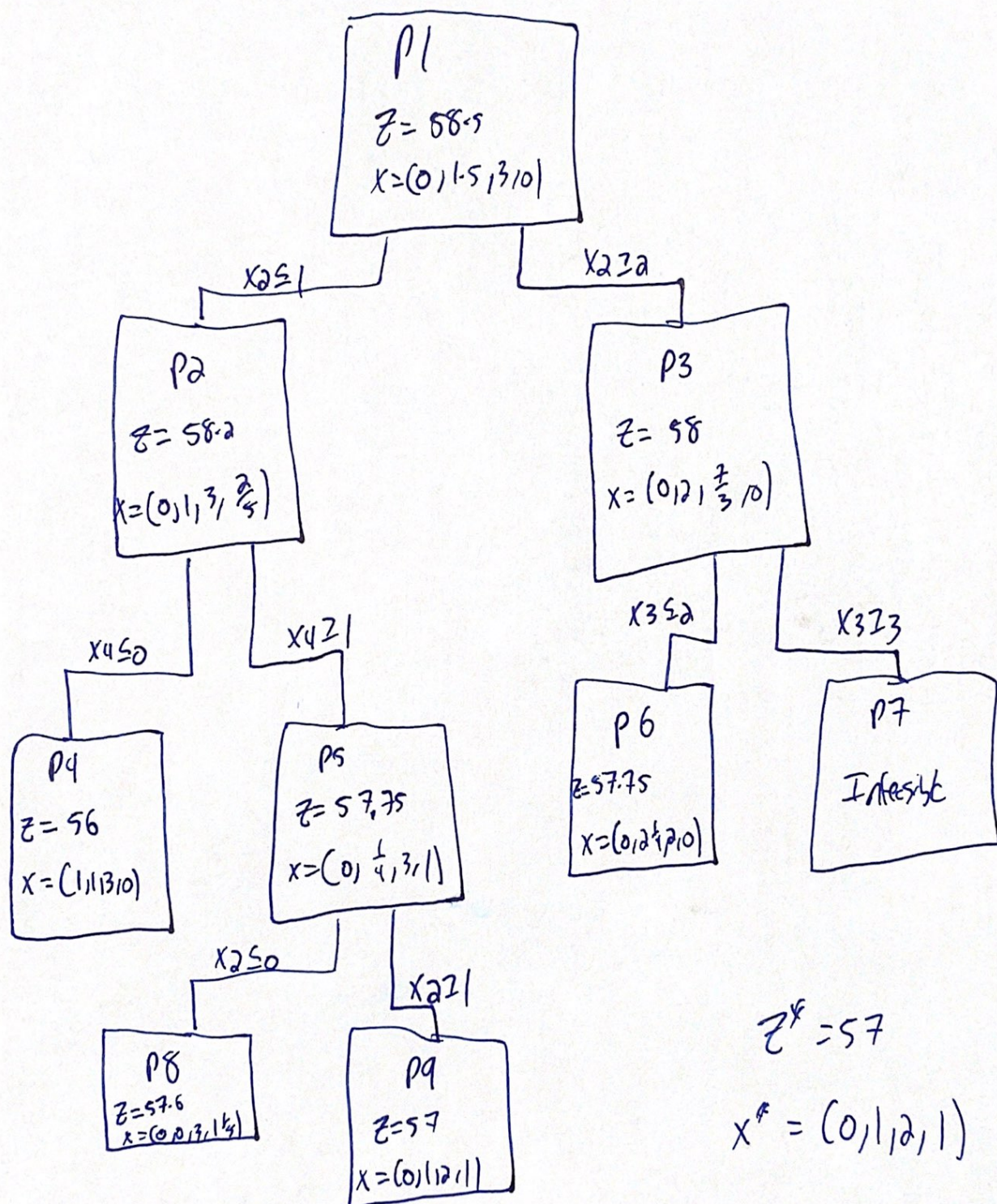
$$x^* = (1, 1, 1, 0, 1)$$

$$Z^* = 70$$



4

3) Tree below, interpretation next page





Step 1: Solve  $P1$ .  $z^* \leq 58.5$  Branch on  $x_2$  (5)

Step 2: Solve  $P2$  and  $P3$ .  $z^* \leq 58.2$

Branch  $P2$

Step 3: Solve  $P4$  and  $P5$ , Get infeasible solution

$$56 \leq z^* \leq 58$$

Branch  $P3$

Step 4: Solve  $P6$  and  $P7$

Eliminate  $P7$ . Now

$$56 \leq z^* \leq 57.75 \quad \text{Branch } P5$$

Step 5: Solve  $P8$  and  $P9$ .  $P9$  is integer and replaces

$P4$ . Now

$$57 \leq z^* \leq 57.75.$$

I stopped here.  $x$  must be integer and all of  
obj row is integer. Thus  $z$  must be integer. Since

$$57 \leq z^* \leq 57.75 \Rightarrow z^* = 57 \text{ which we have.}$$