

§9.3 (PART 1): BRANCH & BOUND METHOD FOR PURE IPs

1.] Solve the following IP using the Branch-and-Bound method:

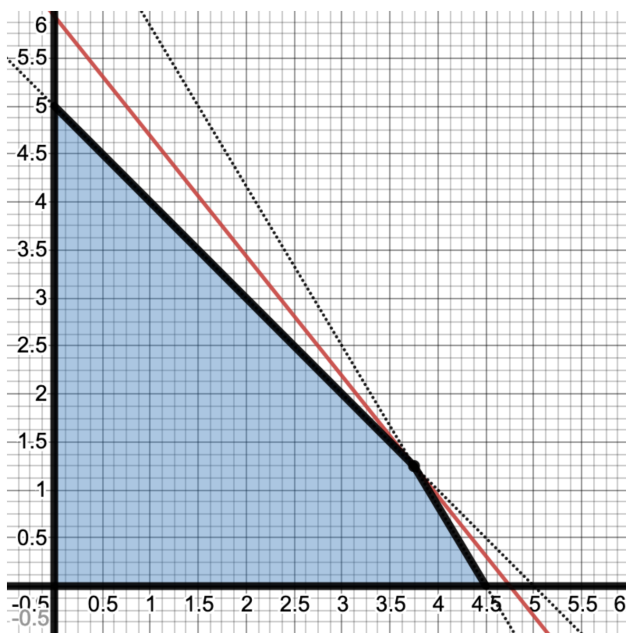
$$\text{Maximize: } z = 5x_1 + 4x_2$$

$$\text{Subject to: } x_1 + x_2 \leq 5$$

$$10x_1 + 6x_2 \leq 45$$

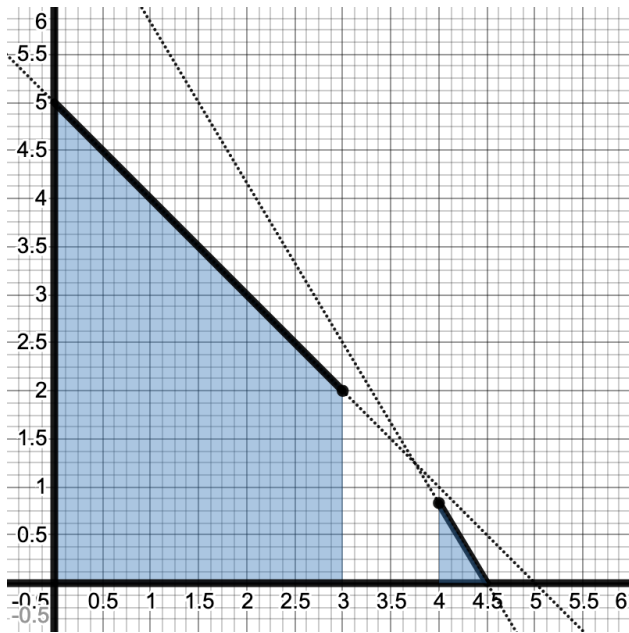
$$x_1, x_2 \geq 0, x_1, x_2 \text{ integer}$$

a.) Solve the LP Relaxation problem:



b.) Label on the graph above the feasible space for the IP. What seems to be the optimal solution for the IP?

- 2.] Using x_1 as the branching variable, divide the solution space into two regions: one with $x_1 \leq 3$ and $x_1 \geq 4$. Write down the corresponding LPs for each subregion, labeling the LP with $x_1 \leq 3$ as LP2 and the LP with $x_1 \geq 4$ as LP3. Solve LP2 first, establish a lower bound on z , then solve LP3.



- 3.] What is the solution to the IP?
- 4.] Discuss the procedure if we would have solved LP3 first.