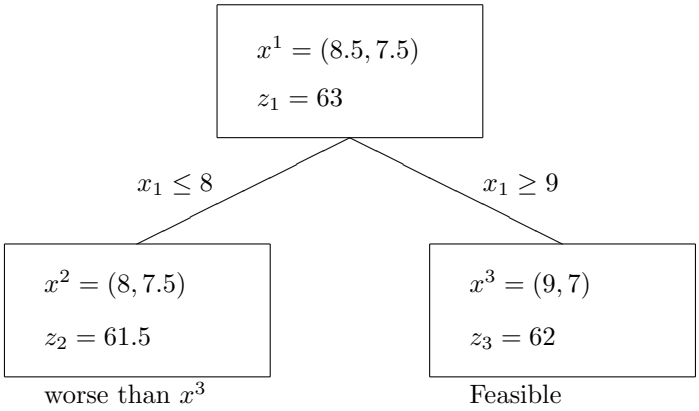
Operations Research, Spring 2017
Suggested Solution for Pre-lecture Problems for Lecture 6

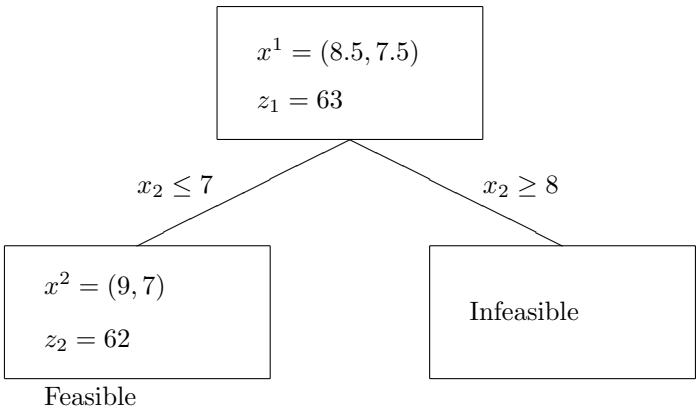
Solution providers: Share Lin
Department of Information Management
National Taiwan University

1. (a) The optimal solution of the linear relaxation is $x^1 = (8.5, 7.5)$.

   (b) Let's branch on x_1 first.



   (c) Branching on x_2



2. (a)

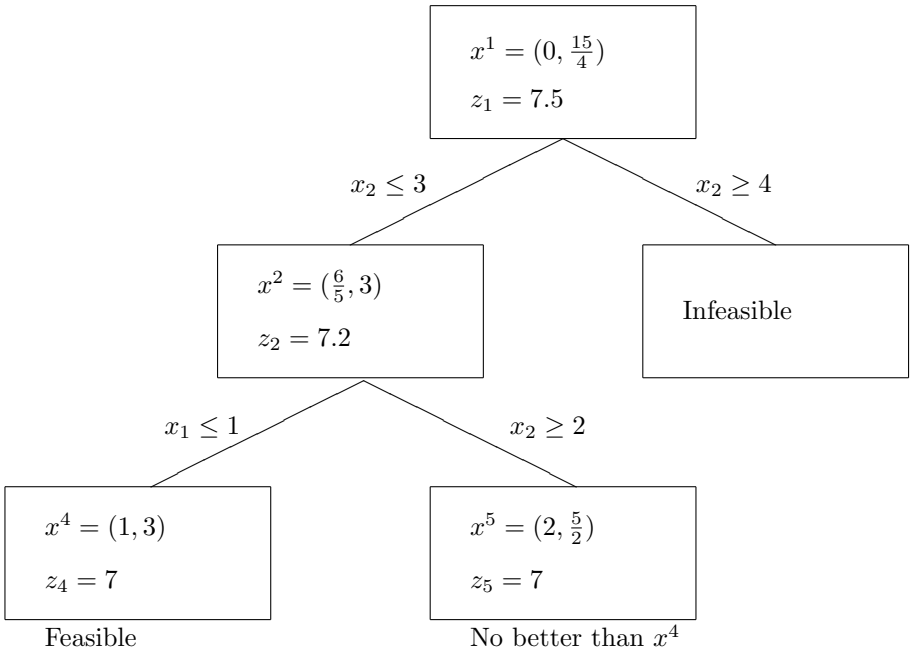
$$M_1 \geq 20 + 10 - 6 = 24$$
$$M_2 \geq 10 + 20 - 8 - 22$$

   (b) The feasible region on the (x_1, x_2) plane is shown in Figure 1. By comparing the two extreme

Figure 1: Feasible region for Problem 2.b

   points (0, 6) and (8, 0) in the feasible region, (8, 0) is the better one and therefore the optimal solution.

3. Let $z = x_1 + x_2$. First, solve the linear relaxation and get $x^1 = (0, \frac{15}{4})$ with the objective value $z_1 = 7.5$. By the branch-and-bound algorithm, the optimal solution for the original IP is $x^4 = (1, 3)$ with the objective value $z_4 = 7$.


$x^1 = (0, \frac{15}{4})$
$z_1 = 7.5$
$x_2 \leq 3$
$x_2 \geq 4$
$x^2 = (\frac{6}{5}, 3)$
$z_2 = 7.2$
Infeasible
$x_1 \leq 1$
$x_2 \geq 2$
$x^4 = (1, 3)$
$z_4 = 7$
$x^5 = (2, \frac{5}{2})$
$z_5 = 7$
Feasible
No better than x^4