

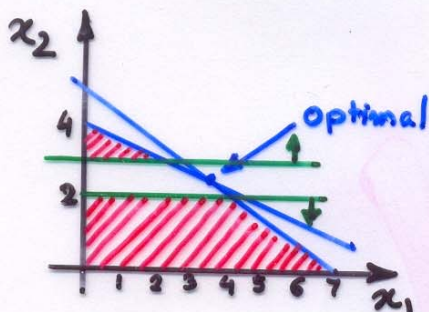
# SOLVING INTEGER PROGRAMS (THE BRANCH-AND-BOUND TECHNIQUE)

LET US LOOK AT THE EXAMPLE : MAXIMIZE  $Z = 2x_1 + 3x_2$   
S.T.

$$5x_1 + 7x_2 \leq 35$$

$$4x_1 + 9x_2 \leq 36$$

$$x_1, x_2 \text{ integers.}$$

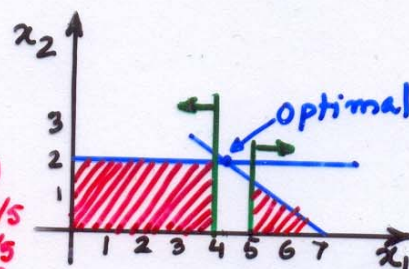


①  
 $Z = 14 \frac{8}{17}$   
 $x_1 = 3 \frac{12}{17}$   
 $x_2 = 2 \frac{6}{17}$

$x_2 \geq 3$

BRANCHING

$x_2 \leq 2$



③  
 $Z = 13 \frac{1}{2}$   
 $x_1 = 2 \frac{1}{4}$   
 $x_2 = 3$

NO POINT  
 PROCEEDING,  
 AS  $Z < 14$  AND  
 CAN ONLY BECOME  
 WORSE

BOUNDING

②  
 $Z = 14 \frac{2}{5}$   
 $x_1 = 4 \frac{1}{5}$   
 $x_2 = 2$

$x_1 \geq 5$

$x_1 \leq 4$

⑤  
 $Z = 14 \frac{3}{7}$   
 $x_1 = 5$   
 $x_2 = 1 \frac{3}{7}$

④  
 $Z = 14$   
 $x_1 = 4$   
 $x_2 = 2$

INTEGER  
 SOLUTION

$x_2 \leq 1$

$x_2 \geq 2$

⑦  
 $Z = 14 \frac{1}{5}$   
 $x_1 = 5 \frac{3}{5}$   
 $x_2 = 1$

NO FEASIBLE  
 SOLUTION

$x_1 \geq 6$

$x_1 \leq 5$

⑨  
 $Z = 14 \frac{1}{7}$   
 $x_1 = 6$   
 $x_2 = \frac{5}{7}$

⑧  
 $Z = 13$   
 $x_1 = 5$   
 $x_2 = 1$

INTEGER  
 SOLUTION

$x_2 \geq 1$

$x_2 \leq 0$

NO FEASIBLE  
 SOLUTION

⑩  
 $Z = 14$   
 $x_1 = 7$   
 $x_2 = 0$

INTEGER  
 SOLUTION