

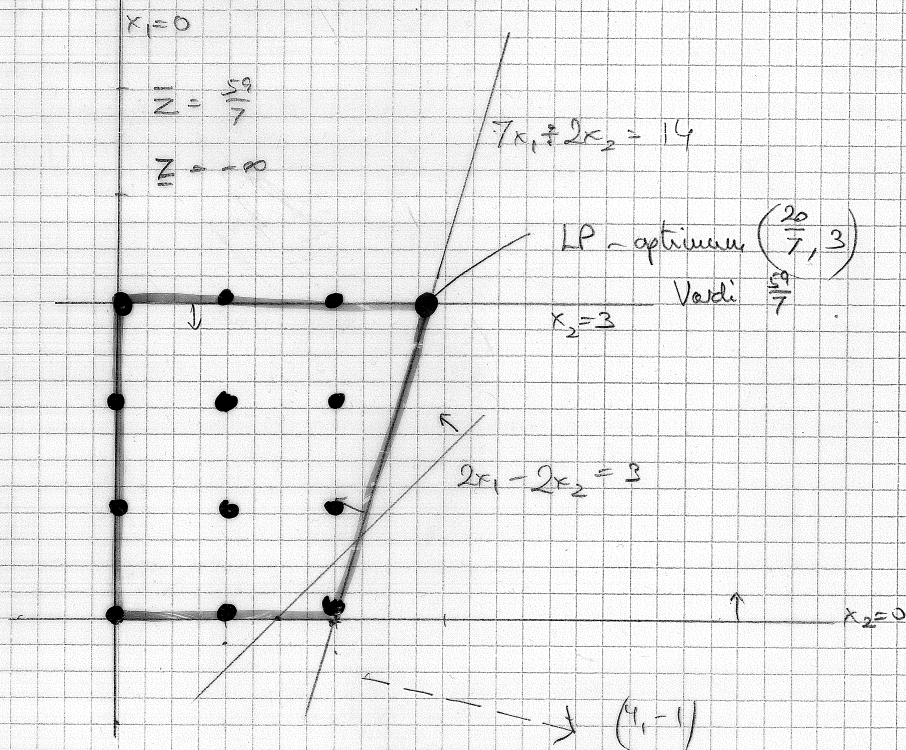
$$z = \max 4x_1 - x_2$$

$$7x_1 - 2x_2 \leq 14$$

$$x_2 \leq 3$$

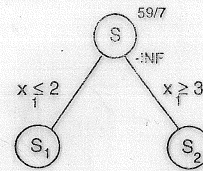
$$2x_1 - 2x_2 \leq 3$$

$$x \in \mathbb{Z}_+^2$$



$$\bar{z} = \max \frac{59}{7}$$

$$\begin{array}{rcll} x_1 & -\frac{4}{7}x_3 & -\frac{1}{7}x_4 & \\ & +\frac{1}{7}x_3 & +\frac{2}{7}x_4 & = \frac{20}{7} \\ x_2 & & +x_4 & = 3 \\ & -\frac{2}{7}x_3 & +\frac{10}{7}x_4 & +x_5 = \frac{23}{7} \\ x_1, x_2, x_3, x_4, x_5 & & & \geq 0. \end{array}$$

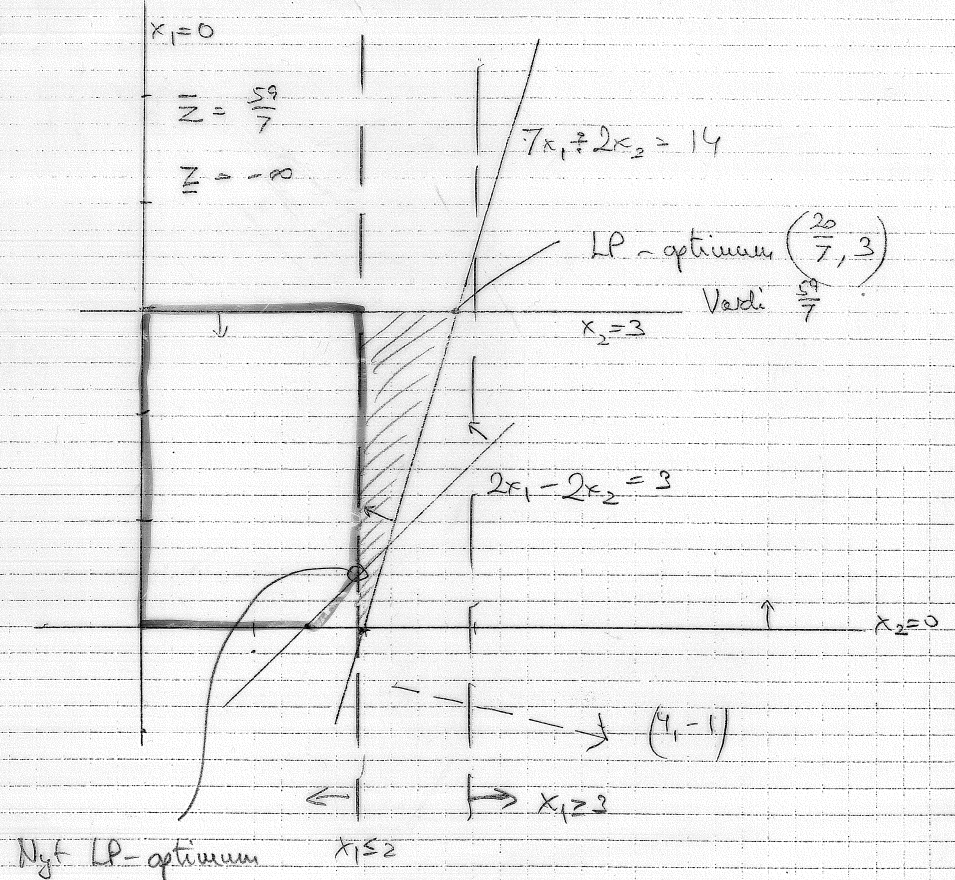


Thus we have the dual feasible representation:

D & P 3

$$\bar{z}_1 = \max \frac{59}{7}$$

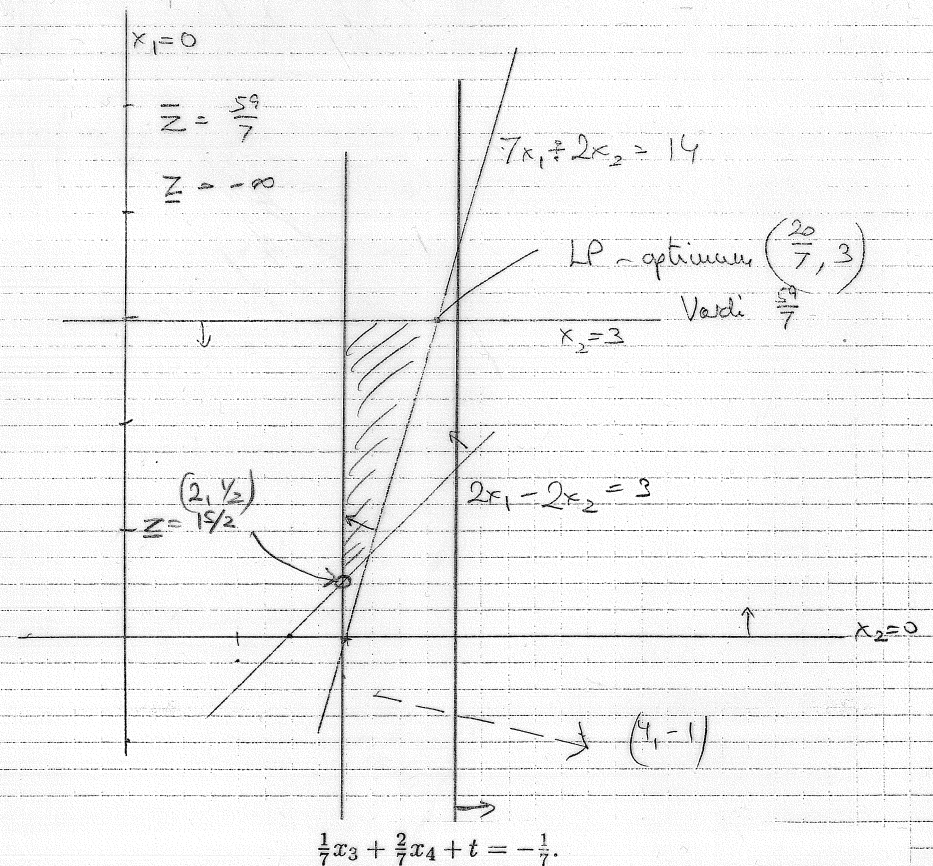
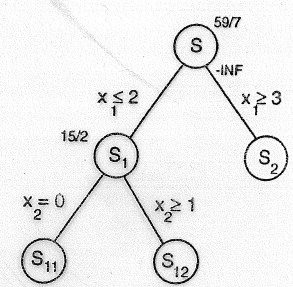
	$-\frac{4}{7}x_3$	$-\frac{1}{7}x_4$		
x_1	$+\frac{1}{7}x_3$	$+\frac{2}{7}x_4$	$=$	$\frac{20}{7}$
x_2		$+x_4$	$=$	3
	$-\frac{2}{7}x_3$	$+\frac{10}{7}x_4$	$+x_5$	$= \frac{23}{7}$
	$-\frac{1}{7}x_3$	$-\frac{2}{7}x_4$	$+s$	$= -\frac{6}{7}$
$x_1, x_2, x_3, x_4, x_5, s$	$\geq 0.$			



After two simplex pivots, the linear program is reoptimized, giving:

$$\bar{z}_1 = \max \frac{15}{2}$$

	$-\frac{1}{2}x_5$	$-3s$		
x_1		$+s$	$=$	2
x_2	$-\frac{1}{2}x_5$	$+s$	$=$	$\frac{1}{2}$
x_3	$-x_5$	$-5s$	$=$	1
x_4	$+\frac{1}{2}x_5$	$+6s$	$=$	$\frac{5}{2}$
$x_1, x_2, x_3, x_4, x_5, s$	≥ 0			

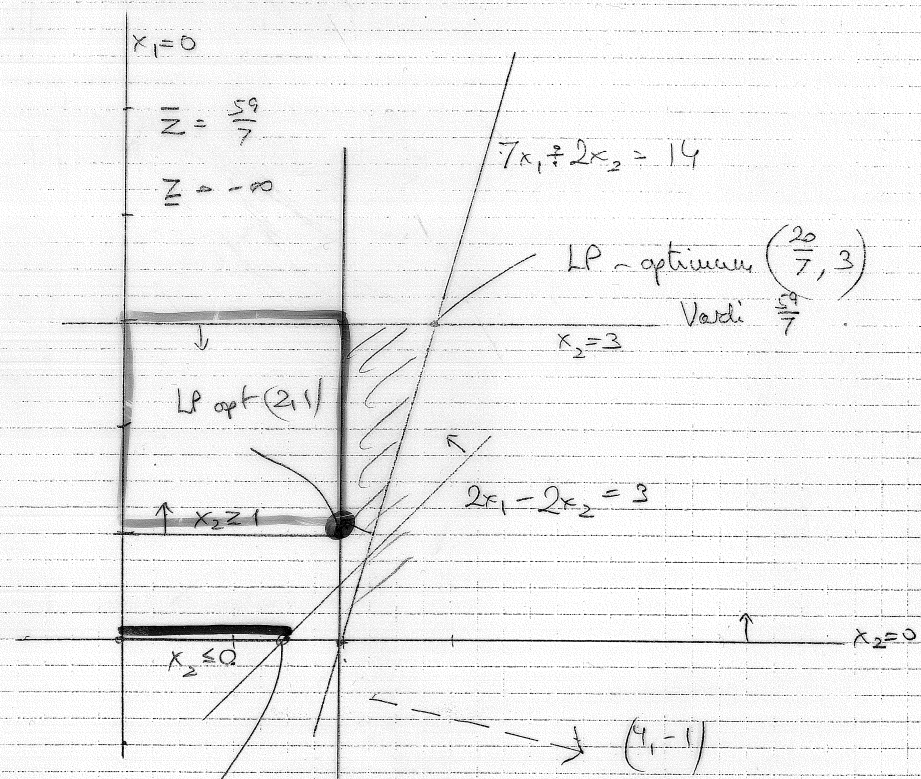


$$\frac{1}{7}x_3 + \frac{2}{7}x_4 + t = -\frac{1}{7}.$$

From inspection of this constraint, we see that the resulting linear program

$$\begin{array}{rclcl} \bar{z}_2 = \max & \frac{59}{7} & & & \\ & -\frac{4}{7}x_3 & -\frac{1}{7}x_4 & & \\ x_1 & +\frac{1}{7}x_3 & +\frac{2}{7}x_4 & = & \frac{20}{7} \\ & & +x_4 & = & 3 \\ x_2 & -\frac{2}{7}x_3 & +\frac{10}{7}x_4 & +x_5 & = \frac{23}{7} \\ & \frac{1}{7}x_3 & +\frac{2}{7}x_4 & +t & = -\frac{1}{7} \\ & x_1, & x_2, & x_3, & x_4, & x_5, & t & \geq & 0 \end{array}$$

is infeasible, $\bar{z}_2 = -\infty$, and hence node S_2 is pruned by infeasibility.



S_2 : infeasibility
 S_{12} : optimality
 S_{11} : bound $Z_{11} \leq Z = 7$

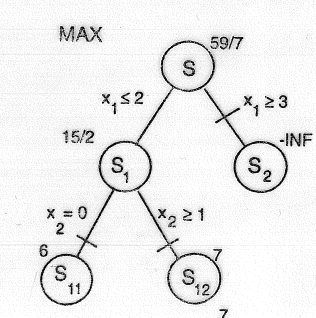


Fig. 7.8 Complete branch and bound tree