

# Week-3 Lecture-5

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$$\text{Max. } 10x_1 + 9x_2$$

$$\text{S.t.}$$

$$x_1 + x_2 \leq 5 \Rightarrow$$

$$4x_1 \geq 24$$

$$x_1, x_2 \geq 0$$

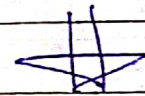
$$\text{Max. } 10x_1 + 9x_2$$

$$\text{S.t.}$$

$$x_1 + x_2 + x_3 = 5$$

$$4x_1 - x_4 = 24$$

$$x_1, x_2, x_3, x_4 \geq 0$$



$$\text{Max } 10x_1 + 9x_2 + 0x_3 + 0x_4 - Ma_1 \quad \text{S.t. } x_1 + x_2 + x_3 = 5$$

$$4x_1 - x_4 + a_1 = 24$$

$$x_1, x_2, x_3, x_4, a_1 \geq 0$$

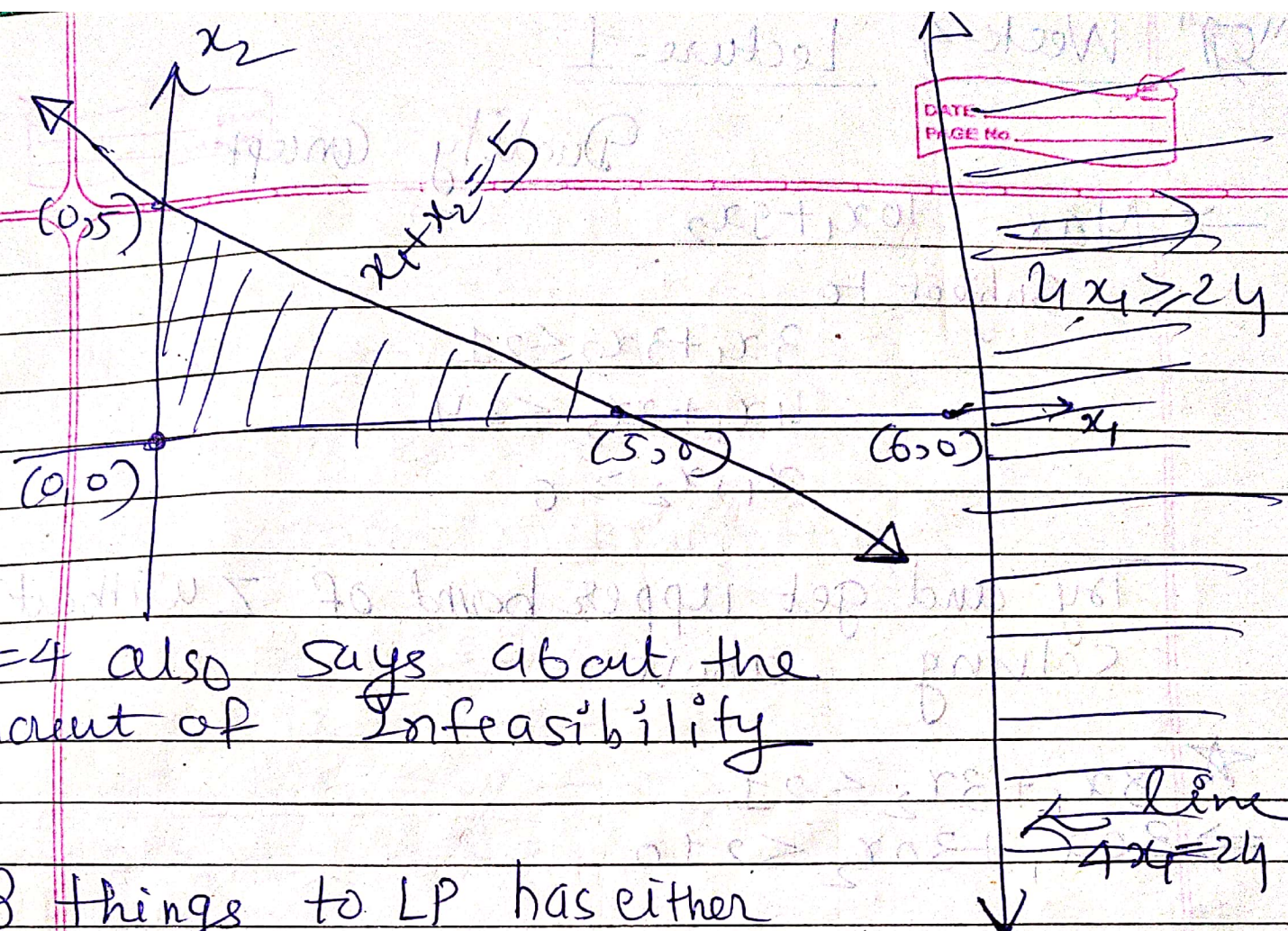
$C_B$	$x_B$	10	9	0	0	-M		
		$x_1$	$x_2$	$x_3$	$x_4$	$a_1$	RHS	
0	$x_3$	(1)	1	1	0	0	5	5 →
-M	$a_1$	4	0	0	-1	1	24	6
$C_j - Z_j$		4M+10	9	0	-M	0		-

$C_B$	$x_B$	$x_1$	$x_2$	$x_3$	$x_4$	$a_1$	RHS
10	$x_1$	1	1	1	0	0	5
-M	$a_1$	0	-4	-4	-1	1	4

$$C_j - Z_j \quad 0 \quad -4M-1 \quad -4M-10 \quad -M \quad 0 \quad -$$

→ After simplex terminates,  $a_1$ , the artificial variable in the sol<sup>n</sup> has strictly positive value, which indicates infeasibility.





$d_1 = 4$  also says about the amount of Infeasibility

3 things to LP has either

- 1) Optimum or
- 2) Unboundedness or
- 3) Infeasibility