

# SIMPLEX ALGORITHM [COMPUTATION DETAILS]

## THE PROBLEM:

$$Z - 3x_1 - 2x_2 = 0 \quad [Z\text{-equation; NOTE WE HAVE TO MAXIMIZE } Z]$$

$$x_1 + 2x_2 + s_1 = 6$$

$$2x_1 + x_2 + s_2 = 8$$

$$-x_1 + x_2 + s_3 = 1$$

$$x_2 + s_4 = 2$$

## TABLEAU REPRESENTATION

### TABLEAU I

BASIC	Z	$x_1$	$x_2$	$s_1$	$s_2$	$s_3$	$s_4$	Solution
Z	1	-3	-2	0	0	0	0	0
$s_1$		1	2	1	0	0	0	6
$s_2$		2	1	0	1	0	0	8
$s_3$		-1	1	0	0	1	0	1
$s_4$		0	1	0	0	0	1	2

← Z equation  
 ] set of constraints

THE ABOVE TABLEAU IS NOT OPTIMAL. NOTICE BOTH  $x_1$  &  $x_2$  (WHICH ARE "0" LEVEL NOW) HAVE NEGATIVE COEF. IN Z EQUATION. THIS IMPLIES THAT BRINGING THESE IN WILL INCREASE Z.

### WHICH TO BRING IN?

THE CURRENT NON-BASIC VARIABLE WHICH HAS THE HIGHEST (negative) COEFFICIENT. IF ALL COEF. ARE NON-NEGATIVE THEN OPTIMALITY HAS BEEN REACHED. IN CASE OF MINIMIZATION (JUST THE OPPOSITE). THIS IS THE SO CALLED OPTIMALITY CONDITION.

### WHICH TO TAKE OUT?

THE LEAVING VARIABLE IS ONE OF THE CURRENT BASIC VARIABLES WHICH WILL REACH ZERO (BEFORE OTHERS) ONCE THE ENTERING VARIABLE ENTERS THE BASIC VARIABLE SET. THIS WILL TELL US WHAT IS THE MAXIMUM LEVEL TO WHICH THE ENTERING VARIABLE CAN BE ACCOMMODATED WITHOUT VIOLATING FEASIBILITY CONDITIONS. THIS IS THE FEASIBILITY CONDITION.