Put the following LP in the standard form:

1- **Max** $\boldsymbol{Z = X_1 - X_2 - 3X_3}$

Subject to

$2X_1 + X_2 - X_3 \leq 2$

$X_1 - 3X_2 + 2X_3 \leq 3$

$X_1 + X_2 - X_3 \geq -2$

$X_1 \geq 0, X_2 \leq 0, X_3\ URS$; $URS: unresticted$

The standard form

Replace X_2 with $(-X_2{}^-)$, and Replace X_3 with $(X_3{}^+ - X_3{}^-)$

Max $Z = X_1 + X_2{}^- - 3X_3{}^+ + 3X_3{}^-$

Subject to:

$2X_1 - X_2{}^- - X_3{}^+ + X_3^- \quad + \boldsymbol{S_1} = 2$

$X_1 + 3X_2{}^- + 2X_3{}^+ - 2X_3{}^- + \boldsymbol{S_2} = 3$

$-X_1 + X_2{}^- + X_3{}^+ - X_3{}^- + \boldsymbol{S_3} = 2$

$X_1, X_2, X_2{}^-, X_3{}^+, X_3{}^-, S_1, S_2, S_3 \geq 0$

2- Max $Z = 3X_1 + 2X_2$

Subject to

$2X_1 + 4X_2 \leq 8$

$X_1 + X_2 \leq 2$

$X_1 \geq 0, X_2 \geq 0$

a) Express the problem in equation form.
b) Determine the all basic solutions and classify them as feasible and infeasible.
c) Use direct substitution in the objective function to determine the optimum basic feasible solution.
d) Verify graphically that the solution obtained in (c) is the optimum LP solution.

The standard form

Max $Z = 3X_1 + 2X_2$

Subject to

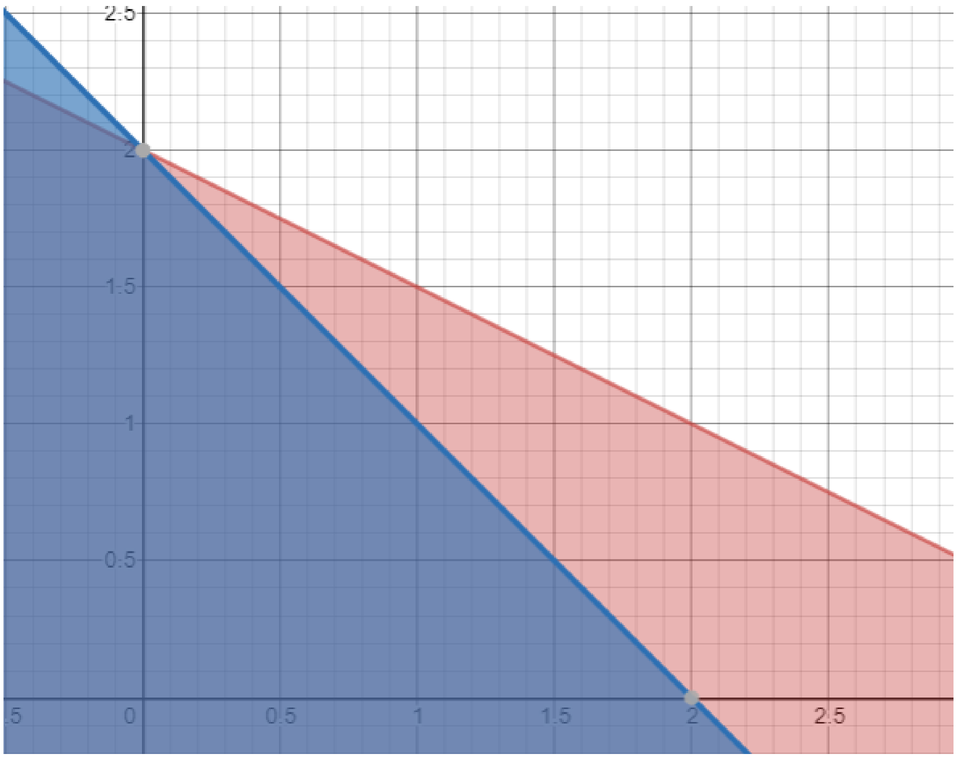
$2X_1 + 4X_2 + \boldsymbol{S_1} = 8$

$X_1 + X_2 + \boldsymbol{S_2} = 2$

$X_1 \geq 0, X_2 \geq 0, S_1 \geq 0, S_2 \geq 0$ (S is slack variable)

We have **m=2** constraints and **n=4** variables, thus **n-m=2** Nonbasic variables (which =0).

Nonbasic Variables	Basic Variables	Basic Solution	Feasibility Status	Extreme point	Objective Value
S_1, S_2	X_1, X_2	0,2	Feasible	B	
S_2, X_2	X_1, S_1	2,4	Feasible	C	
S_1, X_2	X_1, S_2	4,-2	Infeasible		
S_2, X_1	X_2, S_1	2,0	Feasible	B	
S_1, X_1	X_2, S_2	2,0	Feasible	B	
X_1, X_2	S_1, S_2	8,2	Feasible	A	



Put the following LP in the standard form: **H.W**

3- Min $\boldsymbol{Z = 3X_1 + 8X_2 + 4X_3}$

Subject to

$X_1 + X_2 \geq 8$

$2X_1 - 3X_2 \leq 0$

$X_2 \geq 9$

$X_1 \geq 0, X_2 \geq 0$