Maximize $Z = 2x_1 + 3x_2$

$$2x_1 + x_2 \leq 4$$

$$x_1 + 2x_2 \leq 5$$

$$x_1, x_2 \geq 0.$$

Step-I: Replace inequality with equality by introducing slack variable.

$$2x_1 + x_2 + S_1 = 4$$

$$x_1 + 2x_2 + S_2 = 5$$

$$S_1, S_2 \geq 0.$$

Step-II: Write objective function such that RHS = 0.

$$Z - 2x_1 - 3x_2 = 0.$$

Make Simplex Table.

	Z	x_1	x_2 ↓E.V	S_1	S_2	
S_1	0	2	1	1	0	4
S_2	0	1	2	0	1	5
	1	-2	-3 ↑	0	0	0

- First starting point
  $x_1 = 0$, $x_2 = 0$ } x_1, x_2 are called Non-basic variable.
  S_1, S_2 are called as basic variable.

Select most negative co-efficient in objective function.

Here -3. So, x_2 is ~~leaving~~ "Entering" variable.

Step-III: Find Replacement Ratio.

	Z	x_1	x_2 ↓E.V	S_1	S_2		Replacement Ratio
S_1	0	2	1	1	0	4	$\frac{4}{1} = 4$
S_2	0	1	[2]	0	1	5	$\frac{5}{2} = 2.5$ ←
	1	-2	-3	0	0	0	

out of 4, 3 2.5
2.5 is least
so select Row-2
∴ S_2 is leaving variable

[2] → 2 is called as pivot element.

Make pivot element as 1 by dividing 2 from Row-2.

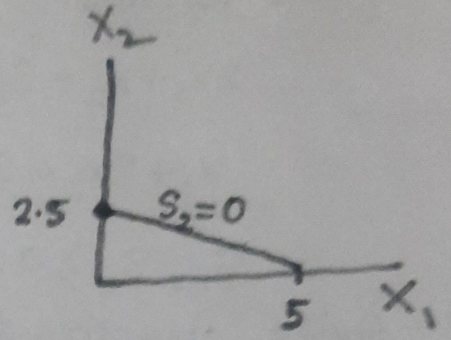
Z	x_1	x_2	s_1	s_2	
0	2	1	1	0	4
0	$\frac{1}{2}$	[1]	0	$\frac{1}{2}$	2.5
1	-2	-3	0	0	0

$R_1 \rightarrow R_1 - R_2$

$R_3 \rightarrow R_3 + 3R_2$ E.V ↓

	Z	x_1	x_2	s_1	s_2	
s_1	0	$\frac{3}{2}$	0	1	$-\frac{1}{2}$	1.5
x_2	0	$\frac{1}{2}$	1	0	$\frac{1}{2}$	2.5
	1	$-\frac{1}{2}$	0	0	$\frac{3}{2}$	7.5

↑ Most -ve



E.V ↓

	Z	x_1	x_2	s_1	s_2		Replacement Ratio
s_1	0	[$\frac{3}{2}$]	0	1	$-\frac{1}{2}$	$\frac{3}{2}$	$3/2 \div 3/2 = 1$ ←
x_2	0	$\frac{1}{2}$	1	0	$\frac{1}{2}$	$\frac{5}{2}$	$5/2 \div 1/2 = 5$
	1	$-\frac{1}{2}$	0	0	$\frac{3}{2}$	$\frac{15}{2}$	

$\frac{3}{2}$ is pivot element.

$R_1 \rightarrow \frac{R_1}{3/2}$

Z	x_1	x_2	s_1	s_2	
0	1	0	$\frac{2}{3}$	$-\frac{1}{3}$	1
0	$\frac{1}{2}$	1	0	$\frac{1}{2}$	$\frac{5}{2}$
1	$-\frac{1}{2}$	0	0	$\frac{3}{2}$	$\frac{15}{2}$