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Simplex :

eg.: $\text{Max } (Z) = 7x_1 + 5x_2$

constraints $\rightarrow 4x_1 + 3x_2 \leq 240$

$$2x_1 + 1x_2 \leq 100$$

Non-negativity constraint - $x_1, x_2 \geq 0$

The simplex method will give the same solution as was given by graphical method.

Step 1: Convert the inequality by adding a slack variable so that it can become an equality.

$$4x_1 + 3x_2 + S_1 = 240$$

$$2x_1 + x_2 + S_2 = 100$$

S_1 and S_2 are unutilised time in varnishing and carpentry department respectively.

Step 2: Achieve homogenisation in objective function and both the constraints.

$$Z = 7x_1 + 5x_2 + 0S_1 + 0S_2$$

$$4x_1 + 3x_2 + 1S_1 + 0S_2 = 240$$

$$2x_1 + 1x_2 + 0S_1 + 1S_2 = 100$$

Since S_1 and S_2 contribute zero profit hence they appear in objective function with zero coefficient.

Step 3: Find the initial basic feasible solution. By putting $x_1, x_2 = 0$ in both the constraints.

$$\Rightarrow 4 \times 0 + 3 \times 0 + 1S_1 + 0S_2 = 240$$

$$\Rightarrow S_1 = 240$$

$$\Rightarrow 2 \times 0 + 1 \times 0 + 0S_1 + 1S_2 = 100$$

$$\Rightarrow S_2 = 100$$

Initial Basic feasible solution -

$$x_1 = 0$$

$$x_2 = 0$$

$$S_1 = 240$$

$$S_2 = 100$$

Step 4: Making ^{first} Simplex Table.

C_j				1	5	0	0	
				x_1	x_2	S_1	S_2	Ratio
				Pivot column				
0	S_1	240	4	3	1	0		$\frac{240}{4} = 60$
0	S_2	100	(2)	1	0	1		$\frac{100}{2} = 50$

Initial solution Mix

Qty

Pivot column

Pivot row