Graphical Procedure: (for 2 variables only)

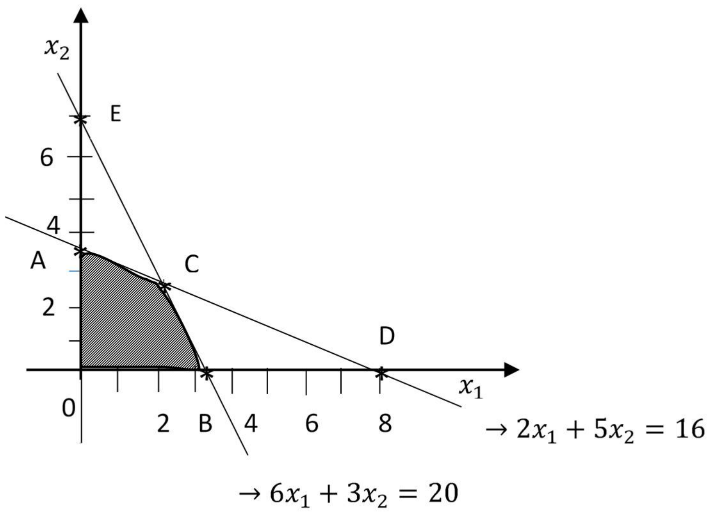
Example: Maximize $z = 5x_{1+} 8x_2$

s. t $2x_1 + 5x_2 \leq 16$

$6x_1 + 3x_2 \leq 20$

$x_1, x_2 \geq 0$

Solution:



$2x_1 + 5x_2 = 16$

Two points on this line $\left(0, \frac{16}{5}\right)$, $(8,0)$

$6x_1 + 3x_2 \leq 20$

Two points on this line $\left(0, \frac{20}{3}\right)\left(\frac{10}{3}, 0\right)$

AOBC -> Feasible region

Pts. O(0,0), $A\left(0, \frac{16}{5}\right)$ $C\left(\frac{13}{6}, \frac{7}{3}\right)$, $B\left(\frac{10}{3}, 0\right)$ are Basic Feasible solutions.

Any one of BFS will be optimum

Here, $z = 0$ at $O(0,0)$

$z = \frac{128}{5}$ at $A\left(0, \frac{16}{5}\right)$

$z = \frac{177}{6}$ at $c\left(\frac{13}{6}, \frac{7}{3}\right)$

$z = \frac{50}{3}$ at $B\left(\frac{10}{3}, 0\right)$

$z = \frac{177}{6}$ is Maximum.

The solution is $x_1 = \frac{13}{6}, x_2 = \frac{7}{3}$

Is the optimal solution.

2) Maximize $z = 10x_1 + 20x_2$

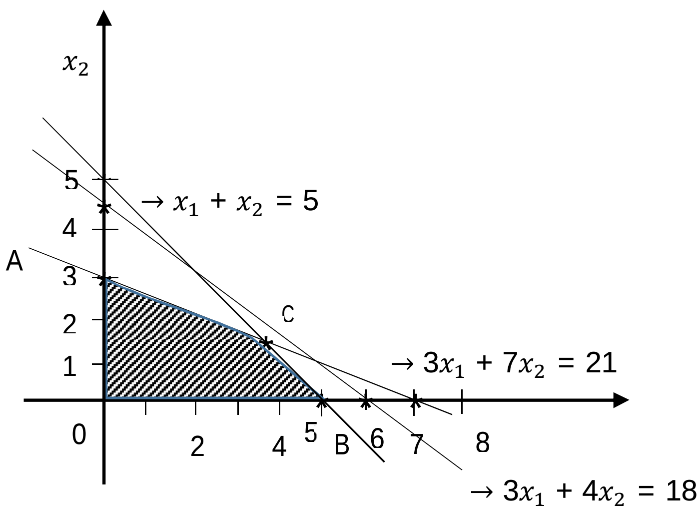
s. t $3x_1 + 4x_2 \leq 18$

$3x_1 + 7x_2 \leq 21$

$x_1 + x_2 \leq 5$

$x_1, x_2 \geq 0$

Solution:



BFS O(0,0), A(0,3), C$\left(\frac{7}{2}, \frac{3}{2}\right)$, B(5,0)

z = 0 at (0,0)

z = 60 at (0,3)

z = 65 at $\left(\frac{7}{2}, \frac{3}{2}\right)$

z = 50 at (5,0)

Maximum at $\left(\frac{7}{2}, \frac{3}{2}\right)$

Optimal Solution is $x_1 = \frac{7}{2}, x_2 = \frac{3}{2}$.

Optimal Value is z=65

Infeasible Solution

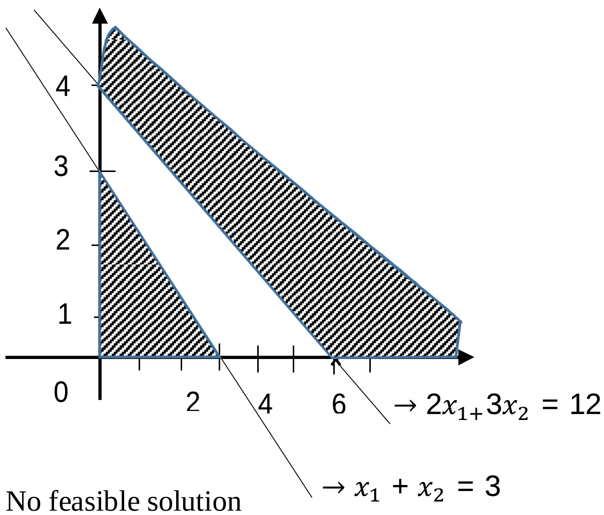
When there is no feasible solution to a lpp, it is said to have infeasible solution.

Example: Max. $z = 4x_1+5x_2$

s.t. $x_1 + x_2 \leq 3$

$2x_1 + 3x_2 \geq 12$

$x_1, x_2 \geq 0$



No feasible solution

<u>Unbounded Solution</u>

When the feasible region of a lpp is an unbounded it is said to have an unbounded solution.

Example: Max $z = 4x_1 + 5x_2$

s.t. $x_1 + x_2 \geq 3$

$2x_1 + 3x_2 \geq 12$