

EE5600 Assignment 3

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Abstract—This document contains the solution of geometry through linear algebra through the concept of optimization.

Download latex and python codes from

https://github.com/abhishekt711/EE5600/tree/master/Assignment_3

1 PROBLEM

Maximize $Z = 5x + 3y$ subject to $3x + 5y \leq 15$,
 $5x + 2y \leq 10$, $x \geq 0$, $y \geq 0$.

2 EXPLANATION

$$Z - 5x - 3y = 0 \quad (2.0.1)$$

$$3x + 5y + s_1 = 15 \quad (2.0.2)$$

$$5x + 2y + s_2 = 10 \quad (2.0.3)$$

We will write the simplex tableau

$$\begin{array}{ccccc} x & y & s_1 & s_2 & c \\ 3 & 5 & 1 & 0 & 15 \\ \boxed{5} & 2 & 0 & 1 & 10 \\ \hline -5 & -3 & 0 & 0 & 0 \end{array} \quad (2.0.4)$$

Keeping the pivot element as 5, we will use gauss-jordan elimination.

$$\begin{array}{ccccc} x & y & s_1 & s_2 & c \\ 0 & \boxed{\frac{19}{5}} & 1 & \frac{-3}{5} & 9 \\ 1 & \frac{2}{5} & 0 & \frac{1}{5} & 2 \\ \hline 0 & -1 & 0 & 1 & 10 \end{array} \quad (2.0.5)$$

Keeping the pivot element as $\frac{19}{5}$, we will use gauss-jordan elimination.

$$\begin{array}{ccccc} x & y & s_1 & s_2 & c \\ 0 & 1 & \frac{5}{19} & \frac{-3}{19} & \frac{45}{19} \\ 1 & 0 & \frac{-2}{19} & \frac{1}{19} & \frac{20}{19} \\ \hline 0 & 0 & \frac{5}{19} & \frac{16}{19} & \frac{235}{19} \end{array} \quad (2.0.6)$$

Using Simplex method, the maximum value of Z is $\frac{235}{19}$.

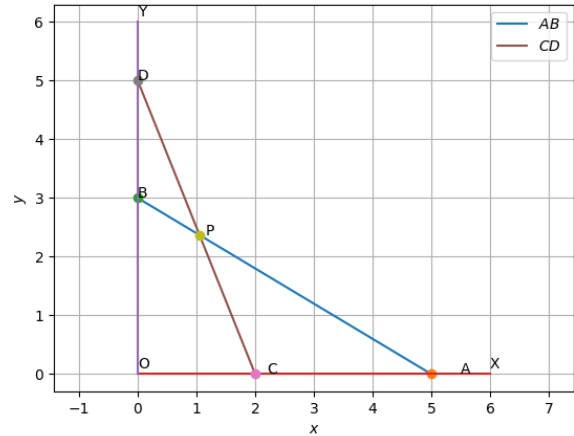


Fig. 0: optimal point through the intersection of various lines