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/sahilsin/AI_ML/blob/master/ Assignment3/

1 Problem

Minimize and Maximize $Z = 5x + 10y$ subject to $x + 2y \leq 120$, $x + y \geq 60$, $x - 2y \geq 0$, $x, y \geq 0$.

2 Solution

First we will plot these lines which are the constraints and the area enclosed by is the region we are interested in.
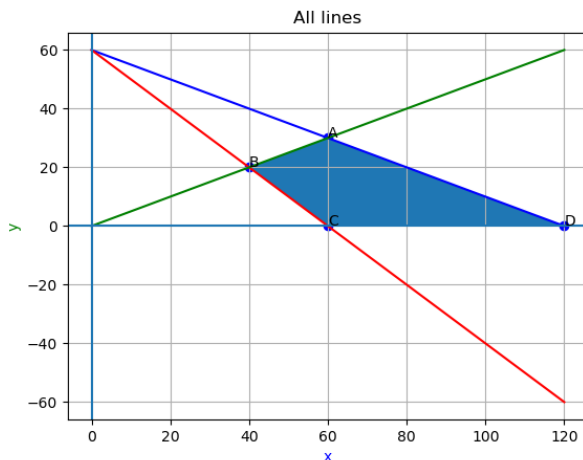

Fig. 0: optimal point through the intersection of various lines

The four points are the points which will maximize and minimize the function. These corner points are :

$$A = (60, 30)$$
$$B = (40, 20)$$
$$C = (60, 0)$$
$$D = (120, 0)$$

Value of Z at point

$$A = 5 \times 60 + 10 \times 30 = 600$$
$$B = 5 \times 40 + 10 \times 20 = 400$$
$$C = 5 \times 60 + 10 \times 0 = 300$$
$$D = 5 \times 120 + 10 \times 0 = 600$$

We can see that our function Z is maximum at points A and D that is (60,30) and (120,0) and
Z is minimum at point C that is (60,0)

3 Verification

The given solution can be verified through the given code.
The given problem can be solved using *cvxpy* through the following code

https://github.com/sahilsin/AI_ML/blob/master/ Assignment3/codes/Ai_ML_3.py