

# Assignment 2

Raja Asawal

**Abstract**—This document explains the concept of a straight line equation that is parallel to a line and is passing through a point.

Download the python code from

[https://github.com/ee17btech11034/AI5106/blob/main/Assignment\\_2/AI\\_assignment\\_2.py](https://github.com/ee17btech11034/AI5106/blob/main/Assignment_2/AI_assignment_2.py)

and latex-tikz codes from

[https://github.com/ee17btech11034/AI5106/blob/main/Assignment\\_2/assignment\\_2.tex](https://github.com/ee17btech11034/AI5106/blob/main/Assignment_2/assignment_2.tex)

## 1 PROBLEM

Find the equation of a line parallel to  $(2 \ 5)x = 11$  passing through the middle point of the join of the points  $\begin{pmatrix} -7 \\ 3 \end{pmatrix}, \begin{pmatrix} 5 \\ -11 \end{pmatrix}$ .

## 2 EXPLANATION

General equation of straight line is given by:

$$\mathbf{D}^T \mathbf{x} = c \quad (2.0.1)$$

D will be same because both lines are parallel.

Passing through mid point M of A, B:

$$\mathbf{M} = \frac{\mathbf{A} + \mathbf{B}}{2} \quad (2.0.2)$$

$$\mathbf{D}^T \mathbf{M} = c \quad (2.0.3)$$

## 3 SOLUTION

So, the mid point M is :

$$\mathbf{M} = \frac{\begin{pmatrix} -7 \\ 3 \end{pmatrix} + \begin{pmatrix} 5 \\ -11 \end{pmatrix}}{2} = \begin{pmatrix} -1 \\ -4 \end{pmatrix} \quad (3.0.1)$$

Constant of line is :

$$c = (2 \ 5) \begin{pmatrix} -1 \\ -4 \end{pmatrix} = -22 \quad (3.0.2)$$

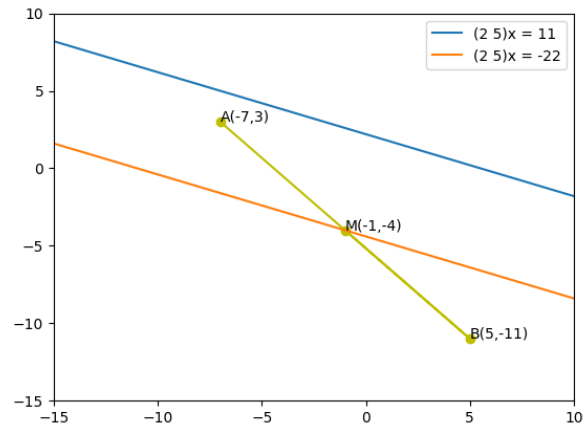


Fig. 0: Parallel Lines

So, the equation of line is :

$$(2 \ 5)x = -22 \quad (3.0.3)$$