

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

and latex-tikz codes from

https://github.com/ee17btech11034/AI5106/blob/main/Assignment_2/assignment_2.tex

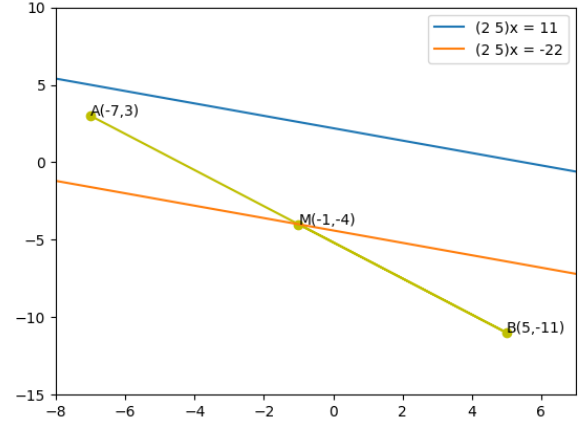


Fig. 0: Parallel Lines

1 PROBLEM

Find the equation of a line parallel to $(2 \ 5)\mathbf{x} = 11$ 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:

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

\mathbf{n} will be same because both lines are parallel.

$$\mathbf{n} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \quad (2.0.2)$$

Passing through mid point M of A, B:

$$\mathbf{M} = \frac{\mathbf{A} + \mathbf{B}}{2} \quad (2.0.3)$$

$$\mathbf{n}^T (\mathbf{x} - \mathbf{M}) = 0 \quad (2.0.4)$$

$$\mathbf{n}^T \mathbf{x} = \mathbf{n}^T \mathbf{M} \quad (2.0.5)$$

3 SOLUTION

So, the mid point M is :

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

$$\mathbf{n}^T \mathbf{x} = (2 \ 5) \begin{pmatrix} -1 \\ -4 \end{pmatrix} = -22 \quad (3.0.2)$$

So, the equation of line is :

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