Assignment 1

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***Abstract*— This document explains the concept of Normal vector, Direction Vector and Y-intercept of a straight line by solving number of problems.**

Download all python codes from https://github.com/cs19resch11004/hari

Download all Latex-tikz codes from https://github.com/cs19resch11004/hari

I. Problem

Find the direction vectors and and y-intercepts of the following lines

$$\begin{pmatrix}1 & 7\end{pmatrix}\vec{X} = 0 \tag{1}$$

$$\begin{pmatrix}6 & 3\end{pmatrix}\vec{X} = 5 \tag{2}$$

$$\begin{pmatrix}0 & 1\end{pmatrix}\vec{X} = 0 \tag{3}$$

Solution:

$$\vec{n} = \begin{pmatrix}a\\b\end{pmatrix} \tag{4}$$

$$\vec{d} = \begin{pmatrix}b\\-a\end{pmatrix} \tag{5}$$

1) Normal vector $\vec{n}$ is

$$\vec{n} = \begin{pmatrix}1\\7\end{pmatrix} \tag{6}$$

Direction Vector $\vec{d}$ = $\vec{A}$ - $\vec{B}$ = $\begin{pmatrix}7\\-1\end{pmatrix}$ - $\begin{pmatrix}0\\0\end{pmatrix}$ = $\begin{pmatrix}7\\-1\end{pmatrix}$

Y-intercept = 0

2) Normal vector $\vec{n}$ is

$$\vec{n} = \begin{pmatrix}6\\3\end{pmatrix} \tag{7}$$

Direction Vector $\vec{d}$ = $\vec{A}$ - $\vec{B}$ = $\begin{pmatrix}0\\5/3\end{pmatrix}$ - $\begin{pmatrix}5/6\\0\end{pmatrix}$) = $\begin{pmatrix}-5/6\\5/3\end{pmatrix}$

Y-intercept = 5/3

3) Normal vector $\vec{n}$ is $\begin{pmatrix}0\\1\end{pmatrix}$

Direction Vector $\vec{d}$ = $\vec{A}$ - $\vec{B}$ = $\begin{pmatrix}5\\0\end{pmatrix}$ - $\begin{pmatrix}2\\0\end{pmatrix}$ = $\begin{pmatrix}3\\0\end{pmatrix}$

Y-intercept = 0