Assignment 1

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***Abstract*—This document finds a unit vector parallel to a given vector**

Download all python codes from

https://github.com/Matish007/Matrix−Theory−EE5609−/tree/master/codes

and latex-tikz codes from

https://github.com/Matish007/Matrix−Theory−EE5609−

1 Problem

Find a unit vector parallel to $\boldsymbol{2a - b + 3c}$

$\boldsymbol{a}=\begin{pmatrix}1\\1\\1\end{pmatrix},\boldsymbol{b}=\begin{pmatrix}2\\-1\\3\end{pmatrix},\boldsymbol{c}=\begin{pmatrix}1\\-2\\1\end{pmatrix}$

2 Explanation

First calculate $\boldsymbol{2a-b+3c}$.Then divide the resultant vector with its magnitude,that will be a unit vector parallel to $\boldsymbol{2a - b + 3c}$

$$\boldsymbol{d} = \boldsymbol{2a - b + 3c} \tag{1}$$

$$\boldsymbol{2a} = \begin{pmatrix}2\\2\\2\end{pmatrix} \tag{2}$$

$$\boldsymbol{-b} = \begin{pmatrix}-2\\1\\-3\end{pmatrix} \tag{3}$$

$$\boldsymbol{3c} = \begin{pmatrix}3\\-6\\3\end{pmatrix} \tag{4}$$

Substituting (2),(3),(4) in (1) we get

$$\boldsymbol{d} = \begin{pmatrix}3\\-3\\2\end{pmatrix} \tag{5}$$

$$\|\boldsymbol{d}\| = \sqrt{3^2 + (-3)^2 + 2^2} = \sqrt{22} \tag{6}$$

$$\boldsymbol{e} = \frac{\boldsymbol{d}}{\|\boldsymbol{d}\|} \tag{7}$$

'e'is the unit vector parallel to given vector Substituting (5),(6) in (7) we get

$$\boxed{\boldsymbol{e} = \frac{1}{\sqrt{22}}\begin{pmatrix}3\\-3\\2\end{pmatrix}} \tag{8}$$

Equation 8 gives us a unit vector $\boldsymbol{e}$ parallel to $\boldsymbol{2a - b + 3c}$