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 $2\bar{a}$-$\bar{b}$+$3\bar{c}$

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

2 Explanation

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

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

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

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

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

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

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

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

$$\hat{d} = \frac{\bar{d}}{\|\bar{d}\|} \tag{7}$$

Substituting (5),(6) in (7) we get

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

Equation 8 gives us a unit vector $\hat{d}$ parallel to $2\bar{a} - \bar{b} + 3\bar{c}$