

EE4013 Assignment-1

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Download all codes from

<https://github.com/dks2000dks/IIT-Hyderabad-Semester-Courses/tree/master/EE4013/Assignment2/codes>

and latex-tikz codes from

<https://github.com/dks2000dks/IIT-Hyderabad-Semester-Courses/tree/master/EE4013/Assignment2>

1 PROBLEM

Show that the points $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \\ 7 \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} 2 \\ 6 \\ 3 \end{bmatrix}$ and $\mathbf{C} = \begin{bmatrix} 3 \\ 10 \\ -1 \end{bmatrix}$ are collinear.

2 SOLUTION

Let $\mathbf{A}_i = \begin{bmatrix} x_{i,0} \\ x_{i,1} \\ \vdots \\ x_{i,n-1} \end{bmatrix}$ represent m i.e $i \in \{0, 1, 2, \dots, m-1\}$

n dimensional vectors. The objective is to check whether these m -points are collinear or not.

We know that if points A, B, C are collinear then,

$$\mathbf{CA} = \lambda \times \mathbf{BA} \quad (2.0.1)$$

If $\mathbf{A} = \begin{bmatrix} a_0 \\ a_1 \\ \vdots \\ a_{n-1} \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} b_0 \\ b_1 \\ \vdots \\ b_{n-1} \end{bmatrix}$ and $\mathbf{C} = \begin{bmatrix} c_0 \\ c_1 \\ \vdots \\ c_{n-1} \end{bmatrix}$ and A, B, C are collinear then,

$$\frac{c_0 - a_0}{b_0 - a_0} = \frac{c_1 - a_1}{b_1 - a_1} = \frac{c_2 - a_2}{b_2 - a_2} \dots = \frac{c_{n-1} - a_{n-1}}{b_{n-1} - a_{n-1}} = \lambda \quad (2.0.2)$$

For the points given in the question,

$$\frac{3-1}{2-1} = \frac{10-2}{6-2} = \frac{-1-7}{3-7} = 2 \quad (2.0.3)$$