

# EE5609 Assignment 1

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**Abstract**—This document contains the solution to find the angle between two lines. Which gives us

Download all python codes from

<https://github.com/ArcticSoup/EE5609-Matrix-Theory/tree/master/Codes>

and latex-tikz codes from

<https://github.com/ArcticSoup/EE5609-Matrix-Theory/tree/master/Assignment1>

$$\cos \theta = \frac{8}{5\sqrt{3}} \quad (2.0.2)$$

$$\Rightarrow \theta = \arccos \frac{8}{5\sqrt{3}}$$

$$\Rightarrow \theta = 22.517^\circ \quad (2.0.3)$$

## 1 PROBLEM

Find the angle between the pair of lines

$$\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$$

$$\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$$

## 2 SOLUTION

Using the definition of a line in co-ordinate geometry, we see from the above two equations, the direction vectors **a** and **b** of the two lines are

$$\mathbf{a} = \begin{pmatrix} 3 \\ 5 \\ 4 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix}$$

respectively. In order to find the angle between the two direction vectors, we use the definition of dot product,

$$\cos \theta = \frac{\mathbf{a}^T \mathbf{b}}{\|\mathbf{a}\| \|\mathbf{b}\|} \quad (2.0.1)$$

Which gives us,

$$\mathbf{a}^T \mathbf{b} = 16$$

$$\|\mathbf{a}\| = \sqrt{50}, \|\mathbf{b}\| = \sqrt{6}$$