Question

Find the direction cosines of a line which makes equal angles with the coordinate axes. **Solution**:

Let θ be the angle made by a line with coordinate axes. The direction cosines of line

1 are given by
$$\begin{pmatrix} \cos \theta \\ \cos \theta \\ \cos \theta \end{pmatrix}$$

Since ||l|| = 1, we have

$$\cos^2 \theta + \cos^2 \theta + \cos^2 \theta = 1 \tag{0.1}$$

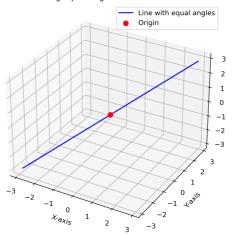
$$3\cos^2\theta = 1 \quad \Rightarrow \quad \cos^2\theta = \frac{1}{3} \tag{0.2}$$

Since θ is an acute angle,

$$\cos \theta = \frac{1}{\sqrt{3}} \tag{0.3}$$

Hence, direction cosines of a line are $\begin{pmatrix} \frac{1}{\sqrt{3}} \\ \frac{1}{\sqrt{3}} \\ \frac{1}{\sqrt{3}} \end{pmatrix}$

Line making equal angles with coordinate axes



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