Intersection of Two lines.

Determine whether two lines intersect or not. In case they intersect, the following algorithm is used to find their point of intersection.

Algorithm for cartesianform: Let the two lines be $\frac{x-x_1}{a_1}=\frac{y-y_1}{b_1}=\frac{z-z_1}{c_1}$ ......(i)

And $\frac{x-x_2}{a_2}=\frac{y-y_2}{b_2}=\frac{z-z_2}{c_2}$ ......(ii)

Step I: Write the co-ordinates of general points on (i) and (ii). The co-ordinates of general points on (i) and (ii) are given by $\frac{x-x_1}{a_1}=\frac{y-y_1}{b_1}=\frac{z-z_1}{c_1}=\lambda$ and $\frac{x-x_2}{a_2}=\frac{y-y_2}{b_2}=\frac{z-z_2}{c_2}=\mu$

respectively.

i.e., $(a_1\lambda+x_1, b_1\lambda+y_1+c_1\lambda+z_1)$ and $(a_2\mu+x_2, b_2\mu+y_2, c_2\mu+z_2)$

Step II: If the lines (i) and (ii) intersect, then they have a common point.

$a_1\lambda+x_1=a_2\mu+x_2, b_1\lambda+y_1=b_2\mu+y_2$ and $c_1\lambda+z_1=c_2\mu+z_2$.

Step III: Solve any two of the equations in λ and μ obtained in step II. If the values of λ and μ satisfy the third equation, then the lines (i) and (ii) intersect, otherwise they do not intersect.

Step IV: To obtain the co-ordinates of the point of intersection, substitute the value of λ (or μ) in the co-ordinates of general point (s) obtained in step I.