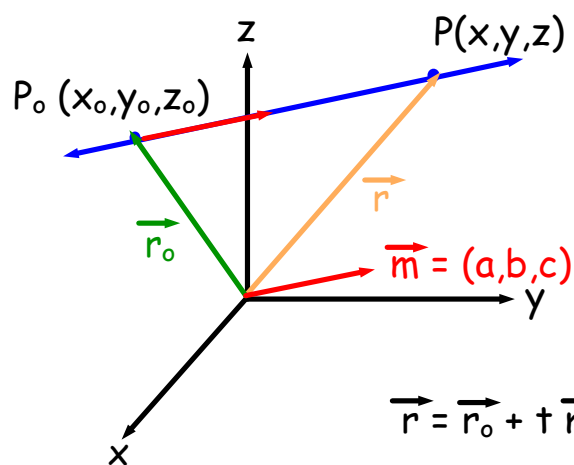


6.3 Vector and Parametric Equations of a Line in $\mathbb{R}^3$ 

$$\vec{r} = \vec{r}_0 + t \vec{m}$$

(vector eqn)

$$(x, y, z) = (x_0, y_0, z_0) + t(a, b, c)$$

(vector eqn, component form)

$$x = x_0 + ta$$

$$y = y_0 + tb$$

$$z = z_0 + tc$$

(parametric equations)

Ex. 1 Write the vector and parametric equations of the line through the given points.

- a) $J(-1, 2, 4)$ and $K(-3, -2, 1)$ b) $C(-3, 2, -1)$ and $D(0, 2, 4)$

Ex. 2 Given the parametric equations of a line in $\mathbb{R}^3$, determine the vector equations.

$$x=3+4t$$

$$y=-1+2t$$

$$z=1-3t$$

Ex. 3 Determine the angle between the lines.

$$\vec{r} = (3, -2, 4) + t(2, -1, 1)$$

$$x = -5 - 3s$$

$$y = 2$$

$$z = 1 + s$$

Ex.4 Determine a vector equation for each line:

a) Parallel to the z-axis and passes through (1,5,10)

b) Parallel to $(x,y,z)=(3,3,0)+t(3,-5,-9)$ with an x-intercept of -10

Ex.5 Are these vector equations the same line?

$$(x,y,z)=(11,-2,17)+t(3,-1,4)$$

$$(x,y,z)=(-13,6,-10)+t(-3,1,-4)$$

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You do not have to write in symmetric form.