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direction cosines

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Defines	direction numbers

If the non-zero vector $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ of \mathbb{R}^3 forms the angles α , β and γ with the positive directions of x -axis, y -axis and z -axis, respectively, then the numbers

$$\cos \alpha, \cos \beta, \cos \gamma$$

are the *direction cosines* of the vector. Any triple l, m, n of numbers, which are <http://planetmath.org/Variation> proportional to the direction cosines, are *direction numbers* of the vector.

If $r = \sqrt{x^2 + y^2 + z^2}$ is the of \vec{r} , we see easily that

$$\cos \alpha = \frac{x}{r}, \quad \cos \beta = \frac{y}{r}, \quad \cos \gamma = \frac{z}{r}.$$

Conversely, the components of the vector on the coordinate axes may be obtained from

$$x = r \cos \alpha, \quad y = r \cos \beta, \quad z = r \cos \gamma.$$

We also see that the direction cosines satisfy

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1.$$