Contents

1 Direction Vectors

$r = O + tD$ Is the general equation of a ray. If you want to know if a point belongs on a line you can substitute it as r and find the appropiate value of t. So lets assume, $\vec{O} = (2, 1, 1)$ and $\vec{D} = (1, 1, 1)$ and we want to know if the point $\vec{r} = (3, 2, 2)$ lies on the line. First we substite our value of r to get: $(3, 2, 2) = (2, 1, 1) + t(1, 1, 1)$, $t = 1$ so our point lies on the line.

1.1 Simplifying Direction Vectors

The magnitude of a direction vector doesnt matter only the direction does, so they are typically represented as unit vectors to keep our values of t clean.

1.2 Parametric Form

By letting $r = (x, y, z)$ we can create three seperate equations: $(x, y, z) = (a_1, a_2, a_3) + t(b_1, b_2, b_3)$ to give use three similatenous equations like so: $r_n = a_n + tb_n$