Plane Intersection in Raytracing

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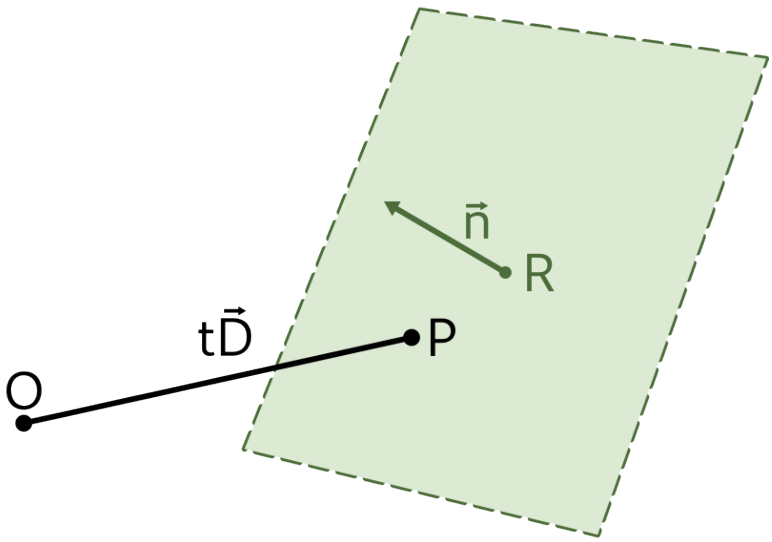
Ray-plane intersection at point P for an unbounded plane satisfies the following equation,

$$(P - R) \bullet \vec{n} = 0 \tag{1}$$

where R is the reference point or the "center", $\vec{n}$ is the normal vector of the unbounded plane.



In raytracing, we define a ray with origin point O and a unit direction vector $\vec{D}$ multiplied by the length coefficient t. So that, P can be written as a function of t,

$$P(t) = O + t\vec{D}$$

Solve **Equation 1** for $P(t)$,

$$(O + t\vec{D} - R) \bullet \vec{n} = 0$$

For the ease of representation we define,

$$\vec{X} = O - R$$

So that,

$$\begin{gathered}(t\vec{D} + \vec{X}) \bullet \vec{n} = 0 \\ t\vec{D} \bullet \vec{n} = -\vec{X} \bullet \vec{n} \\ t = -\frac{\vec{X} \bullet \vec{n}}{\vec{D} \bullet \vec{n}}\end{gathered} \tag{2}$$