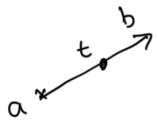
Ray Tracing

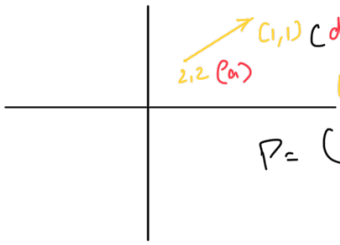
→ Line / Ray



d_{xy} (vec2)

$t \Rightarrow$ Distance

$$P_{xy} = a_{xy} + b_{xy} * t \quad [b \simeq d]$$



$P = (2,2) + (1,1)$;

let $t = 2$

$P = (2,2) + (2,2)$

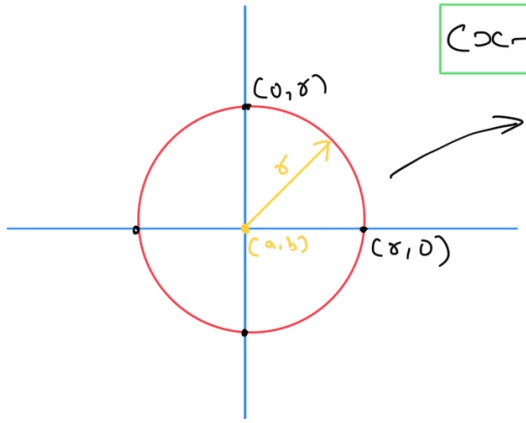
$\Rightarrow P_{xy} = (4,4)$

$$\rightarrow \boxed{\begin{aligned} P_x &= a_x + b_x t \\ P_y &= a_y + b_y t \end{aligned}}$$

Parametric Equation → for an Parameter (t)

$$\boxed{(x-a)^2 + (y-b)^2 = r^2}$$

Circles

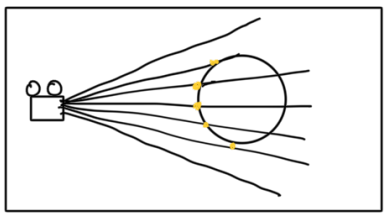


$a = 0$, $b = 0$ → $x^2 + y^2 = r^2$

→ $y^2 = r^2 - x^2$

$y = \pm\sqrt{r^2 - x^2}$

Update the value of Pixel that hits the cube & give some value Based on the Light. & Normals etc



Scene

→ Ray = $a + bt$

b → Direction $(1,1)$ → for now No perspective

a → Camera (let at $(-3,-3)$)

⇒ Circle ⇒ $x^2 + y^2 - r^2 = 0$ → let $r = 2$

→ $a_x + b_x * t$ $\quad$ $a_y + b_y * t$

$$(a_x + b_x * t)^2 + (a_y + b_y * t)^2 - 4 = 0$$

$$\Rightarrow a_x^2 + (b_x t)^2 + 2a_x b_x t + a_y^2 + (b_y t)^2 + 2a_y b_y t - 4 = 0$$

$$(a_x^2 + b_x + c = 0)$$

$$\Rightarrow (b_x^2 + b_y^2)t^2 + 2(a_x b_x + a_y b_y)t + (a_x^2 + a_y^2 - 4) = 0$$

$$\Rightarrow \boxed{\begin{aligned} a &= (-3,-3) \\ b &= (1,1) \end{aligned}}$$

$(1^2 + 1^2)t^2 + 2(-3\times1 + (-3\times1))t + (9 + 9 - 4) = 0$

$2t^2 + 2(-3-3)t + 14 = 0$

$\Rightarrow t = 12 \pm \sqrt{144 - 4\times2\times}$