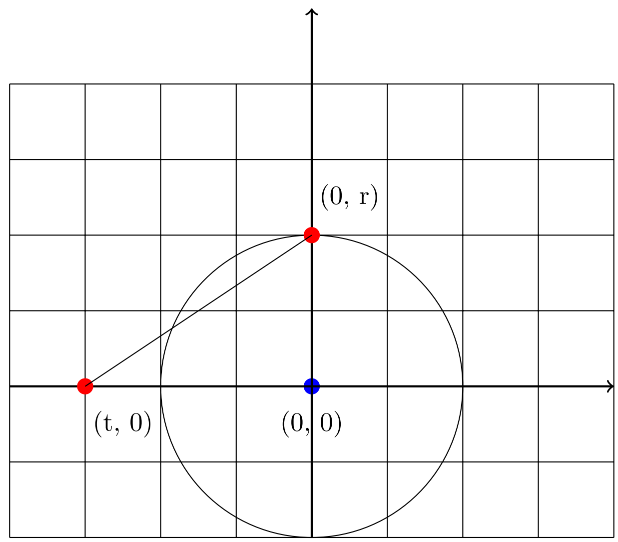

Derived circle parametic equation line equation from (0,r) to (t, 0)

$$\textit{line equatin}$$

$$\frac{y-0}{x-t} = \frac{y-r}{x-0}$$

$$\Rightarrow xy = (y-r)(x-t)$$

$$\Rightarrow xy = xy - rx - yt + rt$$

$$\Rightarrow rx = rt - yt = t(r-y)$$

$$\Rightarrow rx = t(r-y)$$

$$\Rightarrow x = \frac{t}{r}(r-y) \tag{1}$$

$$\textit{Let the circle equation to be}$$

$$x^2 + y^2 = r^2 \tag{2}$$

$$\Rightarrow \left(\frac{t}{r}(r-y)\right)^2 + y^2 = r^2$$

$$\Rightarrow \left(\frac{t}{r}\right)^2 (r-y)^2 + y^2 = r^2$$

$$\Rightarrow t^2(r^2 + y^2 - 2ry) + r^2y^2 = r^4$$

$$\Rightarrow t^2r^2 + t^2y^2 - 2rt^2y + r^2y^2 = r^4$$

$$\Rightarrow (t^2 + r^2)y^2 - 2rt^2y + t^2r^2 - r^4 = 0$$

$$\Rightarrow a = (t^2 + r^2) \quad b = -2rt^2 \quad c = t^2r^2 - r^4$$

$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow y = \frac{2rt^2 \pm \sqrt{4r^2t^4 - 4(t^2+r^2)(t^2r^2-r^4)}}{2(t^2+r^2)}$$

$$\Rightarrow y = \frac{rt^2 \pm \sqrt{r^2t^4 - (t^4r^2 - t^2r^4 + t^2r^4 - r^6)}}{(t^2+r^2)}$$

$$\Rightarrow y = \frac{rt^2 \pm \sqrt{r^2t^4 - t^4r^2 + t^2r^4 - t^2r^4 + r^6}}{(t^2+r^2)}$$

$$\Rightarrow y = \frac{rt^2 \pm \sqrt{t^2r^4 - t^2r^4 + r^6}}{(t^2+r^2)}$$

$$\Rightarrow y = \frac{r(t^2 \pm r^2)}{(t^2+r^2)}$$

$$\Rightarrow \qquad \begin{cases} y = r & (1) \\ y = \dfrac{r(t^2-r^2)}{(t^2+r^2)} & (2) \end{cases}$$

$$\Rightarrow \qquad \begin{cases} x = \dfrac{t}{r}(r-y) & (3) \\ y = r & (3) \end{cases} \Rightarrow$$

$$\Rightarrow \qquad \begin{cases} x = \dfrac{t}{r}(r-y) & (3) \\ y = \dfrac{r(t^2-r^2)}{(t^2+r^2)} & (4) \end{cases}$$

$$\Rightarrow \text{ Sub(2) into (1)}$$

$$\Rightarrow \frac{t^2}{r^2}(r-y)^2 + y^2 = r^2$$

$$\Rightarrow \frac{t^2}{r^2}(r^2 + y^2 - 2ry) + y^2 = r^2$$