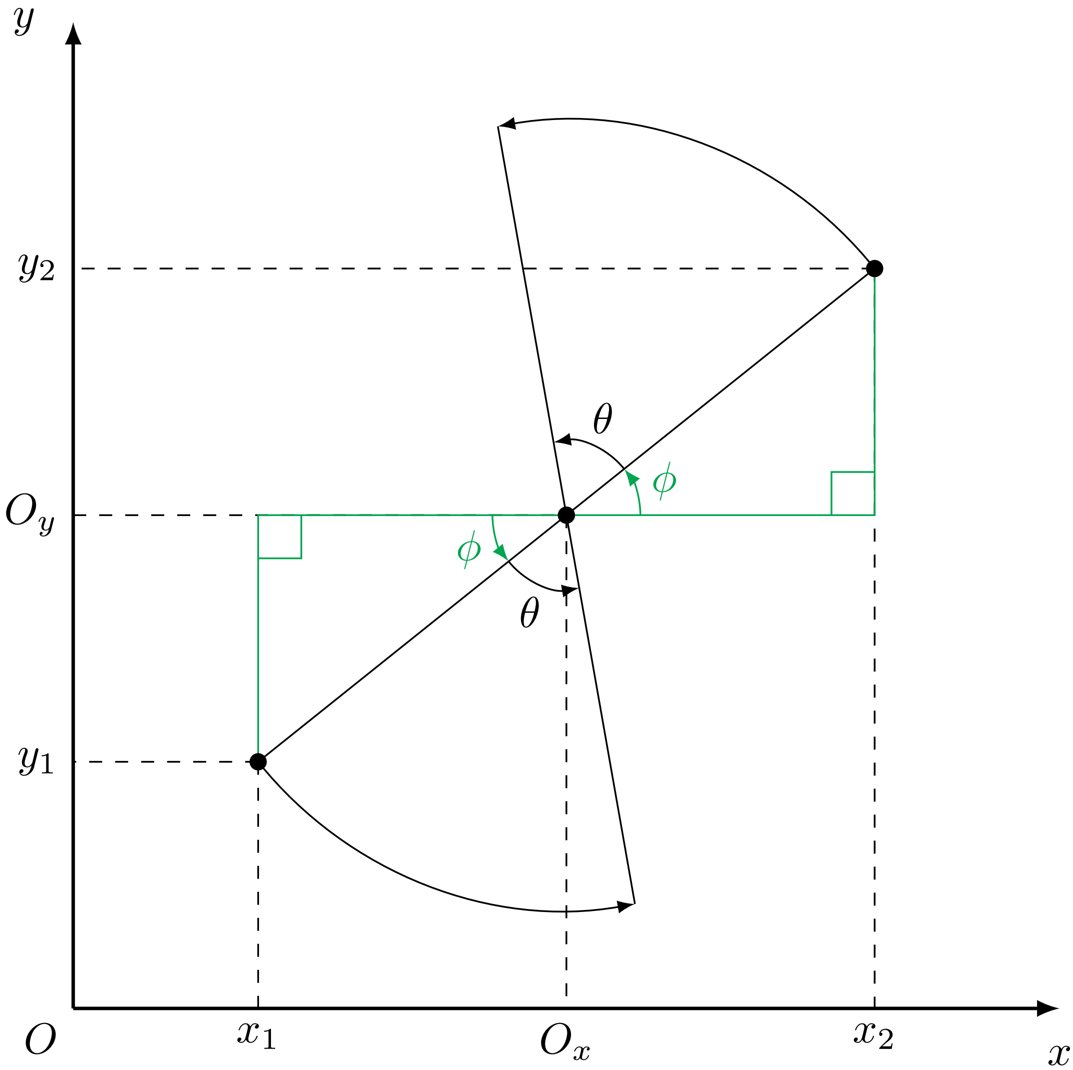
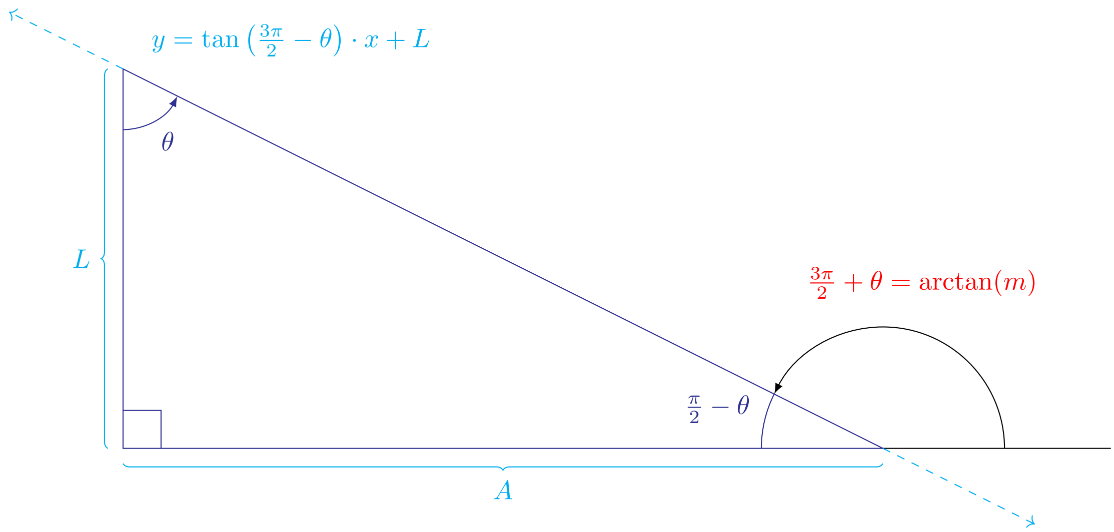


y
y_2
O_y
y_1
O
x_1
O_x
x_2
x
θ
ϕ
ϕ
θ

Where the radial line is of length 1:

$$(x_2, y_2) \longrightarrow (\cos(\phi + \theta) + x_2, \sin(\phi + \theta) + y_2) \tag{1}$$
$$(x_1, y_1) \longrightarrow (-\cos(\phi + \theta) + x_1, -\sin(\phi + \theta) + y_1) \tag{2}$$



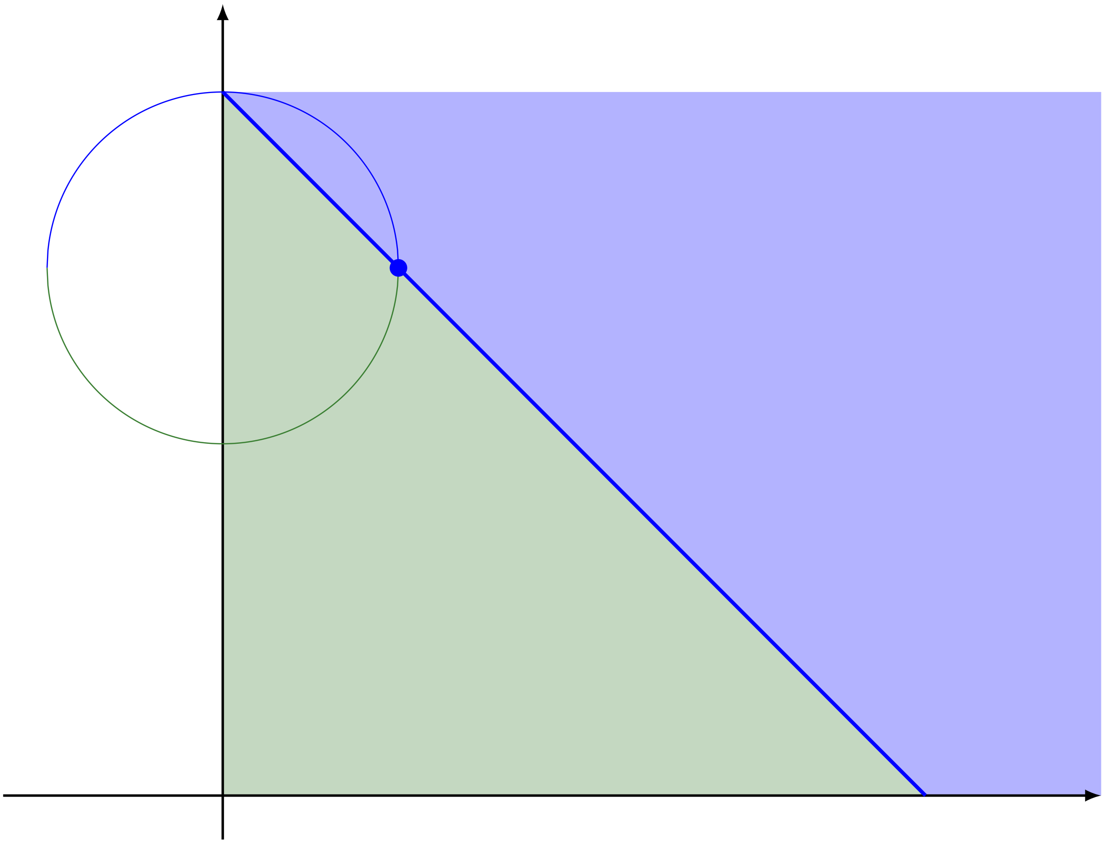
$y = \tan\left(\frac{3\pi}{2} - \theta\right) \cdot x + L$
θ
L
$\frac{3\pi}{2} + \theta = \arctan(m)$
$\frac{\pi}{2} - \theta$
A

$$A = \left(\cos\left(\frac{3\pi}{2} + \theta\right)\right) \cdot \sqrt{A^2 + L^2} \tag{3}$$

$$\therefore \theta(A) \equiv \arccos\left(\frac{A}{\sqrt{A^2 + L^2}}\right) - \frac{3\pi}{2} \tag{4}$$

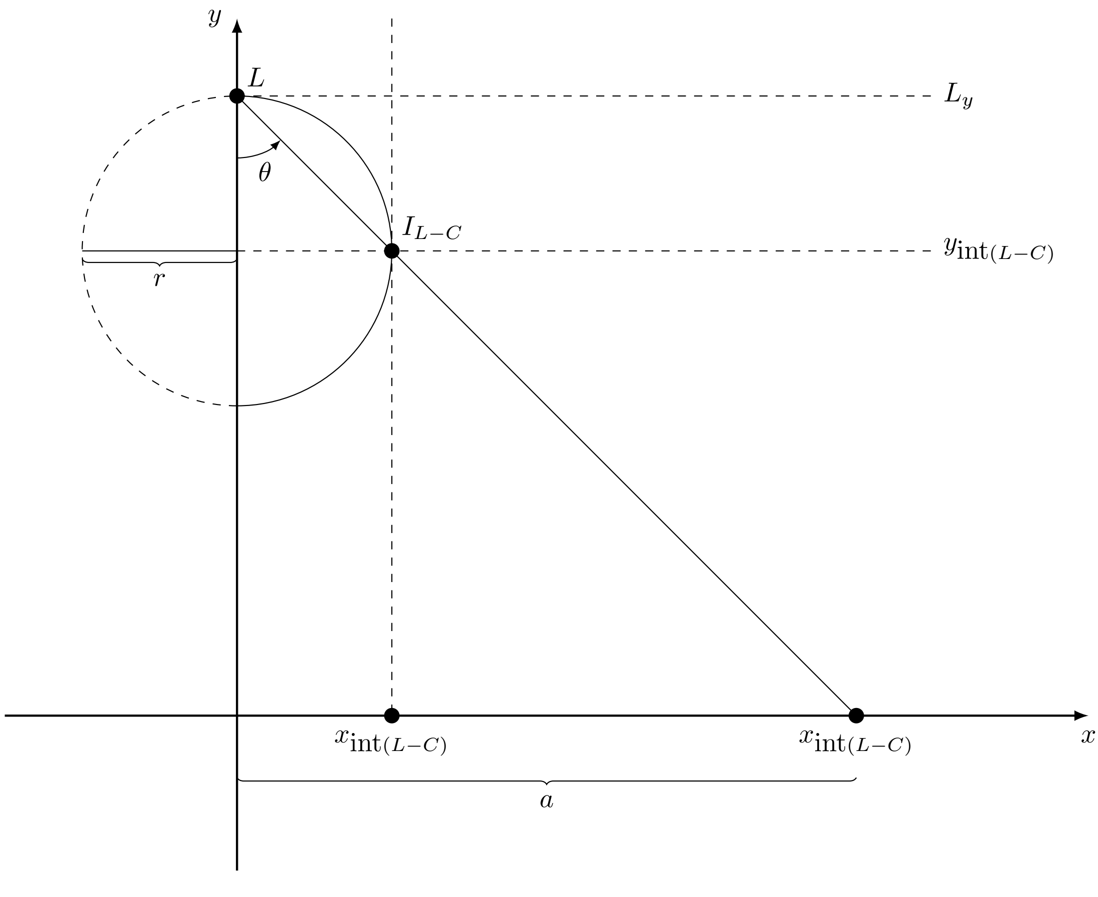
$$\therefore y(x) = \tan\left(\frac{3\pi}{2} - \left(\arccos\left(\frac{A}{\sqrt{A^2 + L^2}}\right) - \frac{3\pi}{2}\right)\right) \cdot x + L \tag{5}$$

$$\text{NB: } |\theta| < \frac{\pi}{2} \tag{6}$$



Per Wolfram|Alpha, x for which line=circle is;

$$x\text{-int}_{(\text{U\&L})}(x) = \frac{2Ar\sqrt{\frac{L^2}{A^2+L^2}}}{\sqrt{A^2+L^2}} \tag{7}$$



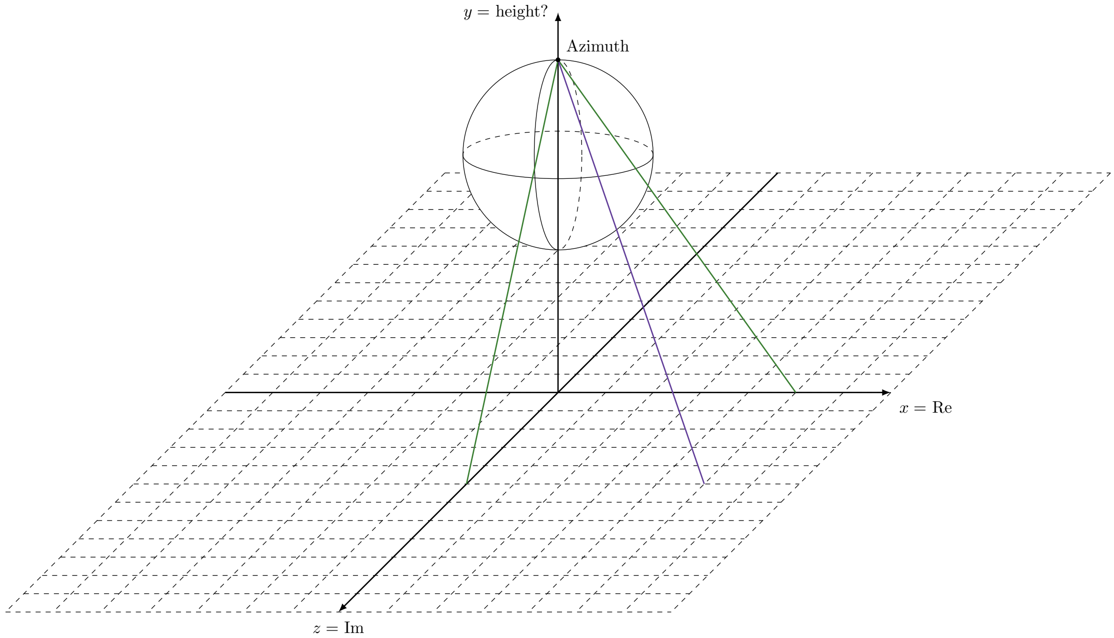
y
L
L_y
θ
I_{L-C}
$y_{\text{int}(L-C)}$
r
$x_{\text{int}(L-C)}$
$x_{\text{int}(L-C)}$
x
a

$$C(x,\theta) = \begin{cases} \sqrt{r^2 - x^2} + L_y - r & \text{if } y \geq L_y - r \\ -\sqrt{r^2 - x^2} + L_y - r & \text{if } y < L_y - r \end{cases} \tag{8}$$

$$L(x,\theta) = \begin{cases} \tan(\theta - \pi) \cdot x + L_y & \text{if } x > 0 \\ \tan(-\theta - \pi) \cdot x + L_y & \text{if } x < 0 \\ 0 & \text{if } x = 0 \end{cases} \tag{9}$$

$$x_{\text{int}(L-C)}(x,\theta) = \begin{cases} \sqrt{\frac{2r(r-\sqrt{r^2-x^2})}{1+\tan(\theta-\pi)}} & \text{if } x \geq 0 \text{ and } y \geq L_y - r \\ -\sqrt{\frac{2r(r-\sqrt{r^2-x^2})}{1+\tan(\theta-\pi)}} & \text{if } x \geq 0 \text{ and } y < L_y - r \\ \text{plus the same sort of equations for x less than zero} \end{cases} \tag{10}$$

$$x_{\text{int}(L-\text{axis})}(x,\theta) = \begin{cases} -L_y \cot(\theta - \pi) & \text{if } x > 0 \\ -L_y \cot(-\theta - \pi) & \text{if } x < 0 \\ 0 & \text{if } x = 0 \end{cases} \tag{11}$$


y = height?
Azimuth
x = Re
z = Im