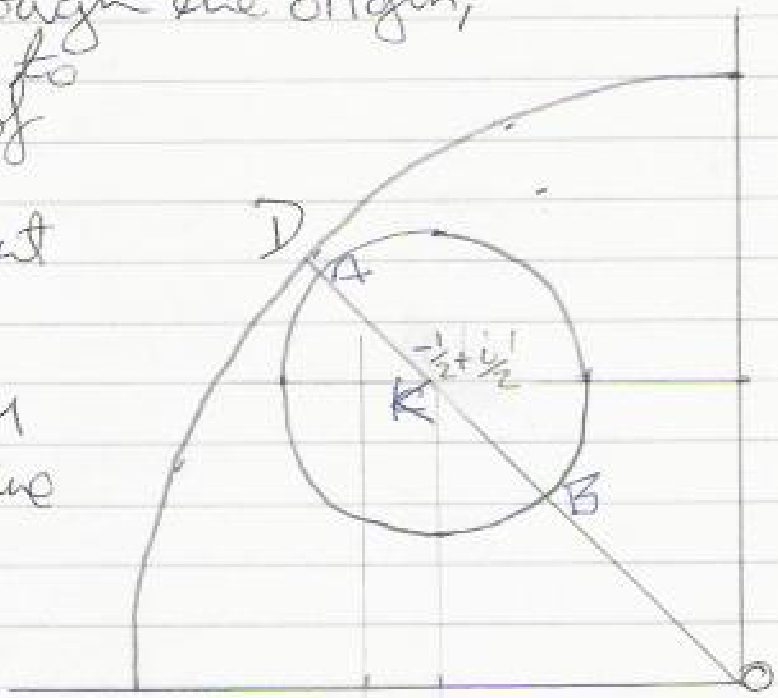
b) The line through the origin, the centre of K to the boundary of the disc is symmetric about the line $y=-x$. We can find a transformation M that maps the line $y=-x$, or equivalently the line OD to the x axis.



It is just a rotation through $3\pi/4$ anticlockwise.

$t(z) = (\cos 45° + i\sin 45)(-x/2 - ix/2)$

$= (1/\sqrt{2} + i/\sqrt{2})(x/2 - ix/2)$

$= \frac{x}{2\sqrt{2}} - \frac{ix}{2\sqrt{2}} + \frac{ix}{2\sqrt{2}} + \frac{x}{2\sqrt{2}}$

$= x/\sqrt{2}$

After transformation the line OD is:

$-1-\left(\frac{4+\sqrt{2}}{4\sqrt{2}}\right)$ $\quad -1/\sqrt{2}$ $\quad -\left(\frac{4-\sqrt{2}}{4\sqrt{2}}\right)$ $\quad 0$

Euclidean length = tanh(non Euclidean length)

non Euclidean centre given by

$\frac{1}{2}\left(\tanh^{-1}\left(\frac{4+\sqrt{2}}{4\sqrt{2}}\right) + \tanh^{-1}\left(\frac{4-\sqrt{2}}{4\sqrt{2}}\right)\right) = -1.202$ ✓

non Euclidean radius given by

$\frac{1}{2}\left(\tanh^{-1}\left(\frac{4+\sqrt{2}}{4\sqrt{2}}\right) - \tanh^{-1}\left(\frac{4-\sqrt{2}}{4\sqrt{2}}\right)\right) = 0.7083$

Now we have to rotate by 315° anticlockwise to find the non Euclidean centre C

$C = (\cos 315 + i\sin 315)(-1.202)$ $\quad -0.8499 + 0.8499i$

$= 0.85 + i0.85 = -0.85 + 0.85i$ ✗

The radius is a magnitude of length.