Solution Problem 1:

$\vec{r}_0 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \quad \vec{r}_1 = \begin{pmatrix} 2 \\ 2 \end{pmatrix}, \quad \phi = \frac{\pi}{8}$

$\vec{r}\,'_0 = \begin{pmatrix} 1.31 \\ 0.54 \end{pmatrix}, \quad \vec{r}\,'_1 = \begin{pmatrix} 2.61 \\ 1.08 \end{pmatrix}$

Straight line in K: $\vec{r}(\lambda) = \vec{r}_0 + \lambda(\vec{r}_1 - \vec{r}_0)$

Assume in K': $\vec{r}\,'(\lambda) = \vec{r}\,'_0 + f(\lambda)(\vec{r}\,'_1 - \vec{r}\,'_0)$

We have $\vec{r}(\lambda)^2 = \vec{r}\,'(\lambda)^2$

$\Rightarrow f(\lambda) = \lambda$, because

$\vec{r}\,'^2_0 = \vec{r}^{\,2}_0 \,; \quad \vec{r}\,'^2_1 = \vec{r}^{\,2}_1, \quad \vec{r}_0 \vec{r}_1 = \vec{r}\,'_0 \vec{r}\,'_1 .$