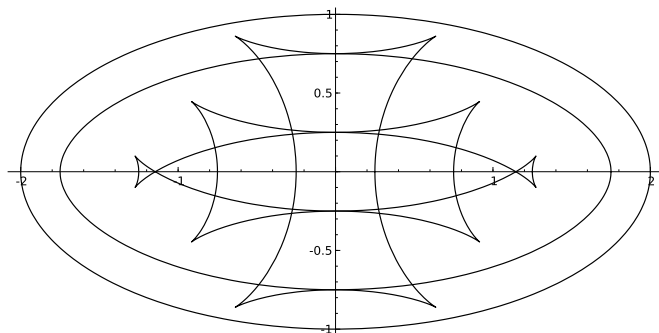


Math 3298 Worksheet 18: more on curvature

Group members (2 to 4): _____

- (1) Suppose we have a plane curve $\vec{r}(t) = (x(t), y(t))$, and we construct a second curve $\vec{p}(t)$ parallel to it, a distance c in the direction of the unit normal vector $\vec{N}$ (so $\vec{p} = \vec{r} + c\vec{N}$). An example of a few such curves are shown in the figure below for the ellipse $\vec{r} = (2\cos(t), \sin(t))$, for four values of c .



Find a formula for the curvature of such curves in terms of c and the curvature κ of the original curve $\vec{r}$. One helpful trick is that you can assume that $\vec{r}$ is parameterized with respect to arclength, so $|\vec{r}'| = 1$.