

- (1) Let $\gamma(t)$ be the curve obtained by tracing a point on a circle of radius 1 rolling along a circle of radius 3 on the inside (see the image here <http://www.math.toronto.edu/vtk/363Winter2014/curve.gif>).
- (a) Find the formula for γ .
 - (b) Find the length of γ .
- (2) Let $\gamma: (\alpha, \beta) \rightarrow \mathbb{R}^2$ be a regular curve. Prove that for any $t_0 \in (\alpha, \beta)$ there is a small $\epsilon > 0$ such that the image $\gamma(t_0 - \epsilon, t_0 + \epsilon)$ can be written as the level set $f(x, y) = c$ where f is smooth and c is a regular value.
- Hint:* use the inverse function theorem.