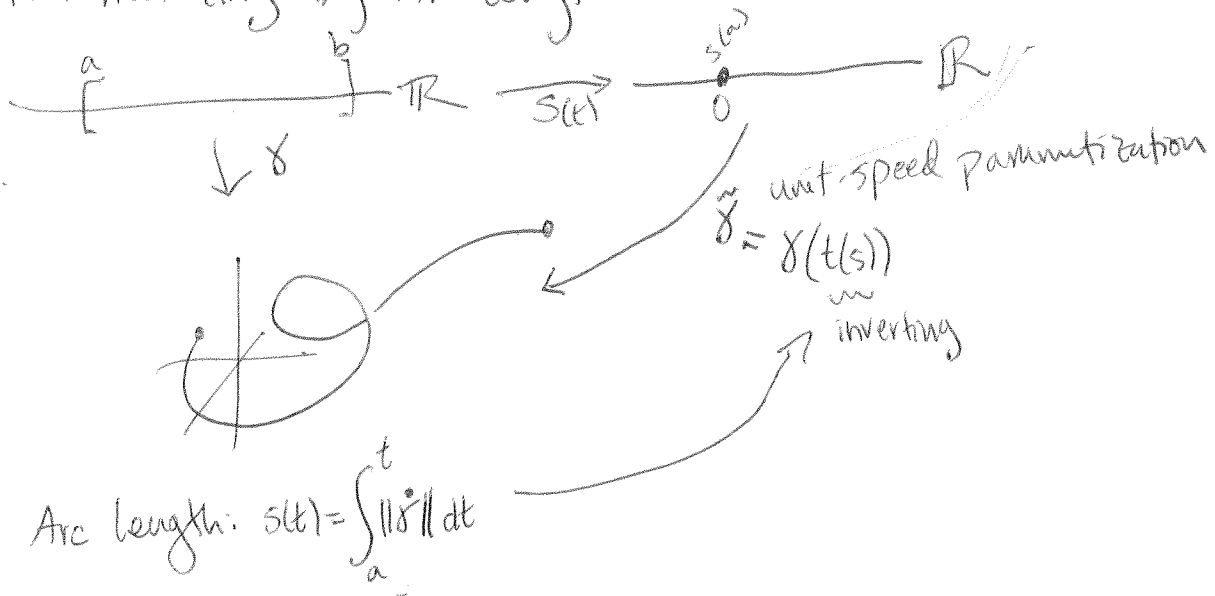
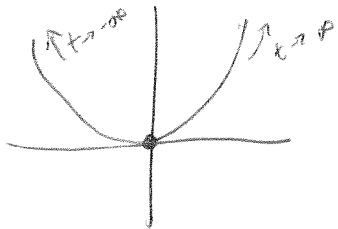


(1.3) Parametrizing by Arc length

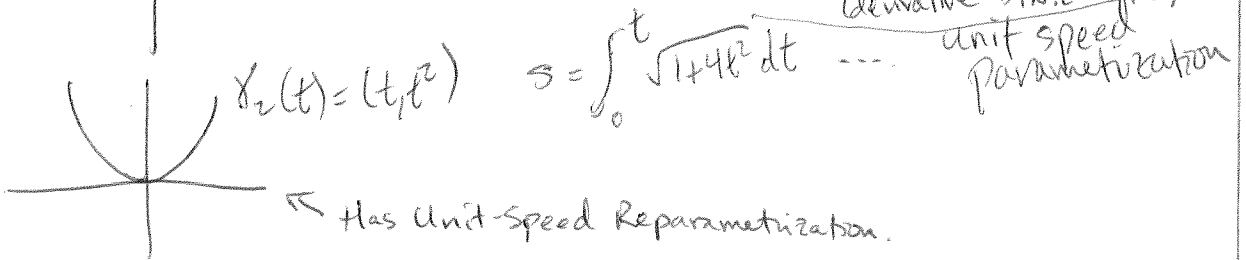


EX:  $\gamma_1(t) = (t^3, t^6)$  not regular at  $t=0$ .



$\gamma_1'(0) = (0,0) \rightarrow s = \int_0^t \sqrt{9t^4 + 36t^{10}} dt$

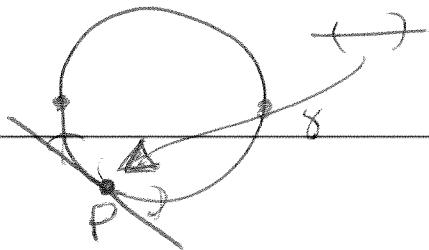
$s(t)$  is smooth + bijective but  $s^{-1}(t)$  is not smooth (derivative D.N.E. at 0)



(1.4)

$f(x,y) = C$

$x^2 + y^2 = 4$



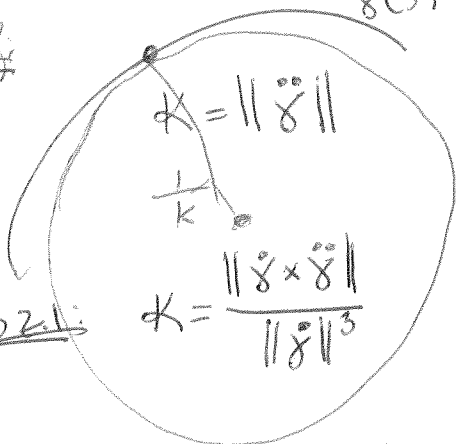
Local inverses exist - either  $y$  in terms of  $x$  or  $x$  in terms of  $y$ .

# Chapter 2

2.1  
2.2

$\gamma(s)$   $\neq$  unit speed parametrization

Def:

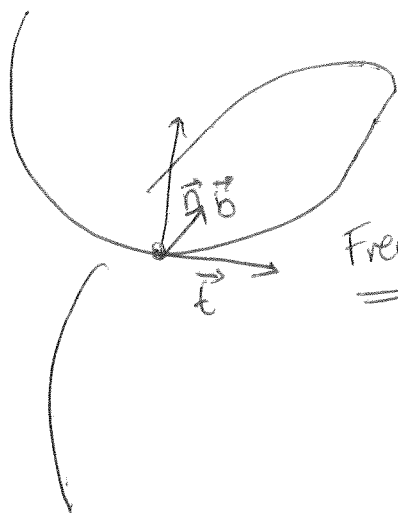
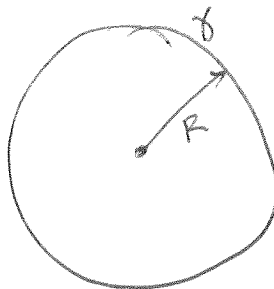


Prop 2.1:

$$\kappa = \frac{\|\ddot{\gamma} \times \dot{\gamma}\|}{\|\dot{\gamma}\|^3}$$

osculating circle

Ex:



$\vec{t} = \dot{\gamma}$  tangent vector

$\vec{n} = \frac{1}{\kappa} \ddot{\gamma}$  normal vector

$\vec{b} = \vec{t} \times \vec{n}$  binormal vector

$\dot{\vec{b}} = -\tau \vec{n}$  torsion