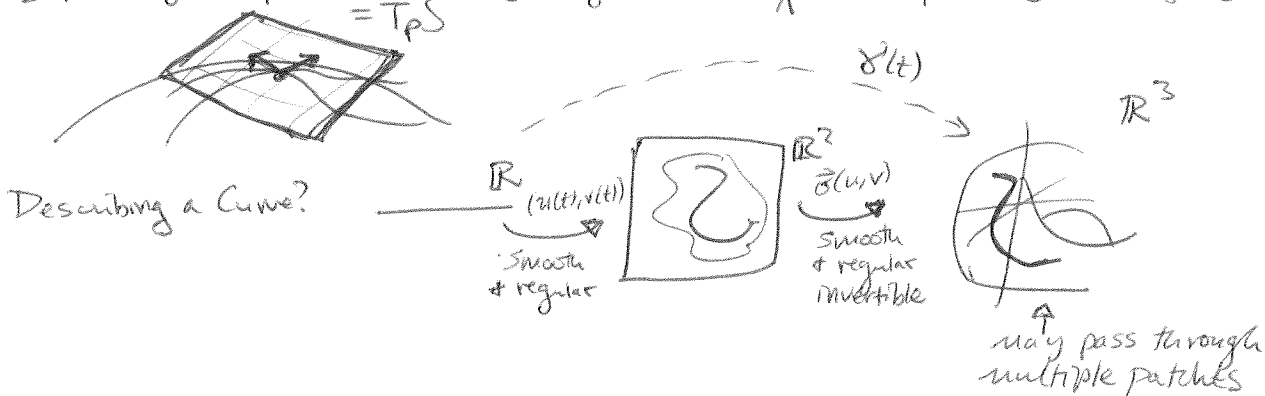


4.3

$S \subseteq \mathbb{R}^3 \Rightarrow$  Regular Coord Patches / Smooth  
 $\Downarrow$   
Tangent Plane at Every Point

Def: Tangent Space = space of tangent vectors  $\gamma'(t)$  at that point of the surface to curves in the surface  
 $= T_p S$



Props ①  $T_p S$  is a vector space, 2-diml, subset of  $\mathbb{R}^3$ .

②  $T_p S$  is spanned by  $\vec{\sigma}_u$  and  $\vec{\sigma}_v$

③ 2-Diml since regular  $\Rightarrow \vec{\sigma}_u$  and  $\vec{\sigma}_v$  are independent

Orientability: Can reconcile all standard unit normals  $\vec{N}_p = \frac{\vec{\sigma}_u \times \vec{\sigma}_v}{\|\vec{\sigma}_u \times \vec{\sigma}_v\|}$   
 $\Leftrightarrow \det(J(\Phi))$  always positive.