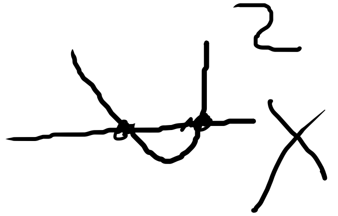
Transversalidad.

bueno ?

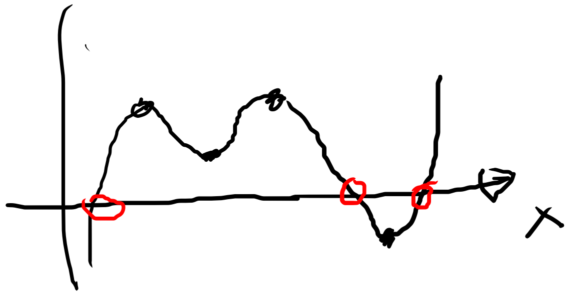
malo ?

$\pitchfork$ 

~~$\pitchfork$~~ 

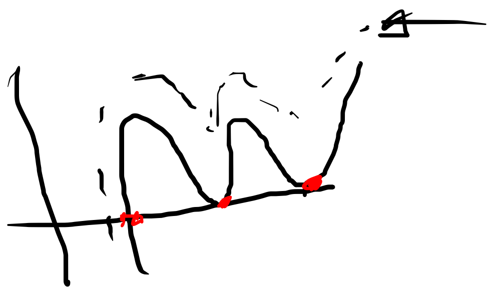
Def: $f: X \longrightarrow Y$ $\quad f \pitchfork Z$
$\qquad\qquad\qquad\qquad \cup$
$\qquad\qquad\qquad\qquad Z$

$y = f(x) = a_0 + a_1 x + \dots + a_5 x^5$



$X \overset{i_X}{\subset} Y$
$\qquad\quad \cup$
$\qquad\quad Z$

$\leftarrow f(x) + \varepsilon$



$i_X \pitchfork Z \iff Z \pitchfork X$

$\begin{cases} f_1(x_1, \dots, x_n) = c_1 \\ f_2(\dots) = c_2 \\ \vdots \\ f_k(\dots) = c_k \end{cases}$

X y Z tienen una intersección transversal

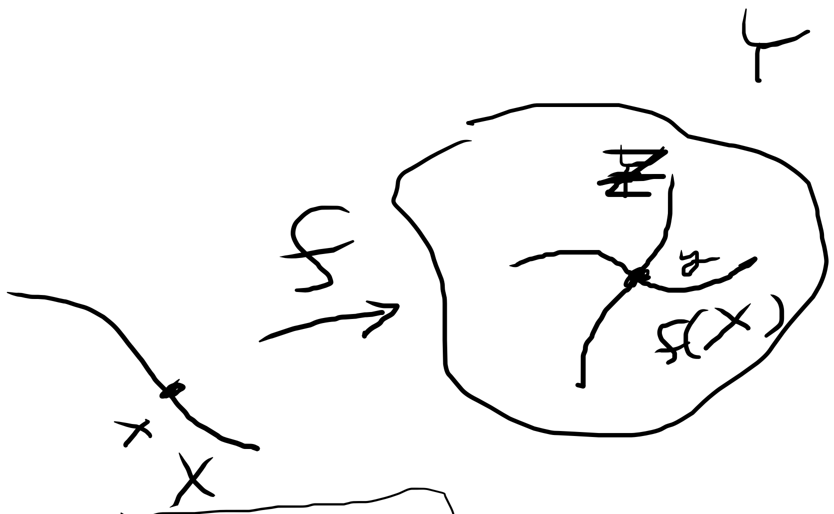
Def: $f: X \to Y$ es $\pitchfork$ a $Z \subset Y$ si
subvar.

$$\boxed{\operatorname{Im}(df_x) + T_yZ = T_yY}$$

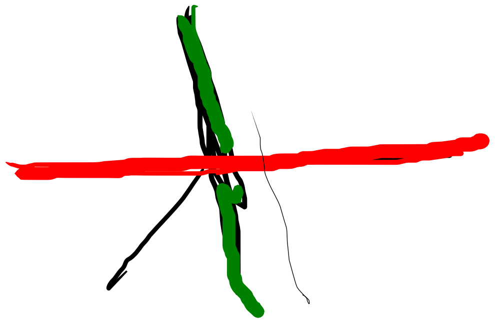
$\widehat{\ }$

T_yY $\quad \forall y \in Z \cap f(X)$

y $x \in f^{-1}(y)$; ó $\boxed{Z \cap f(X) = \emptyset}$



$f(x) = (x, 0, 0)$



$X = \mathbb{R}$, $Y = \mathbb{R}^3$, Z = el eje

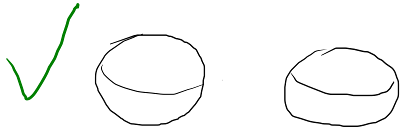
$f: X \to Y$

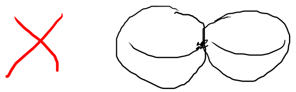
$\quad\quad\quad\quad\cup$

Teo: si $X \pitchfork Z \;(f \pitchfork Z)$ $\quad Z$

$\Rightarrow X \cap Z$ es una variedad

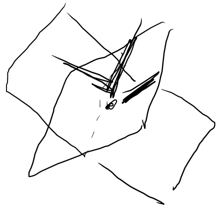
de codim $=$ codim(X) + codim(Z).



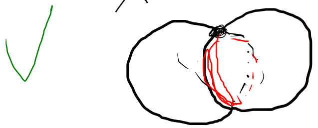


$x = (x_1, \dots, x_{10}) \in \mathbb{R}^{10}$

$X = \begin{cases} f_1(x) = c_1 \\ f_2(x) = c_2 \end{cases}$ $\quad X_1 \quad X_2 \quad X = X_1 \cap X_2$



X $\quad Z$



$Z = \begin{cases} f_3 = c_3 \\ f_4 = c_4 \\ f_5 = c_5 \end{cases}$

Pablo

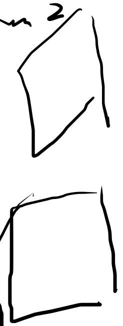
$Y = \mathbb{R}^3$ $\quad$ codim 2

$f_1 = x = 0$

$f_2 = y = 0$

$\cancel{x} = y$

$f_3 = x - y$



$(f_1, \dots, f_k): \mathbb{R}^n \to \mathbb{R}^k$

si df es sobre $\quad k \le n$

$\Rightarrow f^{-1}(c)$ si

a de codim $= k$.

$f = (f_1, f_2, f_3): \mathbb{R}^3 \to \mathbb{R}^3$

(x, y, z) es sumersión

$(x, y, x-y)$ NO es sumersión

$f_1, f_2, \dots, f_k$ son independientes si $\forall x \in M$,

$df_1(x), \dots, df_k(x) \in T^*_x M$

$k \le n = \dim M$

$f: M \to \mathbb{R}^k$ $\quad\quad f_i: M \to \mathbb{R}$

$df: T_x M \to T_y \mathbb{R} = \mathbb{R}$ $\quad\quad T_x(\mathbb{R}^n) = \mathbb{R}^n$