<u>Thm</u>: If $F: M \to N$ is a local diffeom

then $F_*: T_pM \to T_{F(p)}N$ is an isom.

<u>Proof</u>: F local diffeom $\Rightarrow$ $\exists$ ~~diffeos~~, open $U \ni p$

s.t. ~~and smooth~~ φ s.t. $F|_U: U \to \varphi(U) = V$

is a diffeom.

$\Rightarrow (F|_U)^*: T_pU \to T_{F(p)}V$ is an isom

<u>(B, Sd)</u>

have isoms $\iota_*: T_pU \to T_pM$,

$j_*: T_pV \to T_pN$ by <u>Prop 3.7</u>

~~Cas~~

<u>Claim</u>: $(F|_U)_* = j_*^{-1} \circ F_* \circ \iota_*$

<u>Proof</u>: $\forall X \in T_p(U)$, $f \in C^\infty(V)$,

have: $(j_*^{-1} \circ F_* \circ \iota_* \circ X) \circ f$

$\tilde{f}$ from proof of 3.7

$= F_* \circ \iota_* \circ X \circ \tilde{f}$

$= X(\tilde{f} \circ F \circ \iota) = X(f \circ F|_U) = ((F|_U)^* X) f.$