

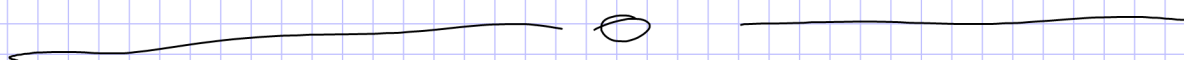
$$L_X(F)_p = \quad (\text{en funciones})$$

$$= X_p(F) = dF_p(X_p)$$

$$= dF_p \left(\left. \frac{d}{dt} \right|_{t=0} \varphi_t(p) \right)$$

$$= \left. \frac{d}{dt} \right|_{t=0} F(\varphi_t(p))$$

$$= \left. \frac{d}{dt} \right|_{t=0} F(\gamma_p'(t))$$



$\omega \in \Omega^k(M)$ se dice cerrada

$$\Leftrightarrow d\omega = 0$$

$\omega \in \Omega^k(M)$ se dice exacta

$$\Leftrightarrow \exists \alpha \in \Omega^{k-1}(M) \ni$$

$$\omega = d\alpha$$

$$d^2 = 0:$$

exacta \Rightarrow cerrada

\nLeftarrow

Producto \wedge :

$\alpha_1, \dots, \alpha_k$ 1-formas:

$$\alpha_1 \wedge \dots \wedge \alpha_k (v_1, \dots, v_k) =$$

$$\left(\neq \alpha_1(v_1) \cdot \dots \cdot \alpha_k(v_k) \right)$$

$$\left(\alpha_i(v_j) \right)_{i,j=1}^k$$

$$= \det \left(\left(\alpha_i(v_j) \right)_{i,j=1}^k \right)$$

$$= \sum_{\sigma \in S_k} \text{sgn}(\sigma) \alpha_1(v_{\sigma(1)}) \cdot \dots \cdot \alpha_k(v_{\sigma(k)})$$



$F: M \rightarrow \mathbb{R}$ es 0-forma γ :

$$L_X(F) = X(F) = dF(X)$$

$$= L(X) dF$$

$$= L(X) dF + d \underbrace{L(X)F}_{=0}$$

(-1)-forma