??
?
?
??
$S\mathcal{T}\tau$
$, S \in$
$\mathcal{T}$
$\mathcal{T}\mathcal{T}$
$\tau S\tau$ **?** $A_2{}^1 A_2 T_2 T_2 SxySxyxUyVUVU\cap$
$V = SXA_2, T_2$
$rC^0 C^1 rrC^r r \geq$
$1rrC^\infty$
$\{X, \tau_X\}\{Y, \tau_Y\} f :$
$X \to$
Y
f
f
$f^{-1} f$
^{2} **?**
$C^r MA_2, T_2 M\{U_\alpha\}, \alpha \in \Gamma\varphi_\alpha :$
$U_\alpha \to$
$\varphi_\alpha(U_\alpha)$
$\varphi_\alpha :$
$U_\alpha \to$
$\varphi_\alpha(U_\alpha) \subset$
$R^n U_\alpha \varphi_\alpha(U_\alpha)^3$
$U_\alpha \cap$
$U_\beta \neq$

$$\varphi_\beta \circ \varphi_\alpha^{-1} : \varphi_\alpha(U_\alpha \cap U_\beta) \to \varphi_\beta(U_\alpha \cap U_\beta)$$

$C^r(r \geq$
$1)MC^r$
$r =$
$0Mr \geq$
$1MC^r \mathcal{D} =$
$\{(U_{\alpha\in\Gamma}, \varphi_\alpha)\}\mathcal{D}M(U, \varphi)\mathcal{D}C^{r4}(U, \varphi)\mathcal{D}\mathcal{D}MC^r$ **?**
$C^\infty(M)M$
$p \in$
M
$X_p :$
$C^\infty(M) \to$
R

$$X_p(f \circ g) = X_p(g)f(p) + g(p)X_p(f), \forall f, g \in C^\infty(M)$$

$X_p p p T_p M$
$p \in$
$MMp\sigma :$
$(-a, a) \to$
M
$\sigma(0) =$
$p\sigma'(0)$

$$\sigma'(0)f = \frac{d}{dt}|_{t=0}[f \circ \sigma(t)], \forall f \in C^\infty(M).$$

$\sigma'(0) \in$
$T_p M$
σ
$\dot{\sigma}(0)$
$p \in$
M
$g_p :$
$T_p M \times$
$T_p M \to$
R
$\forall x_p \in$
$T_p M, g_p(x_p, x_p) \geq$
$0x_p =$
0
$\forall x_p, y_p \in$
$T_p M g_p(x_p, y_p) =$
$g_p(y_p, x_p)$
$gM(M, g)$
$\sigma(t) :$
$[a, b] \to$
$M(M, g)p, qC^1 t \in$
$[a, b]\sigma$

$$L(\sigma) = \int_a^b \|\dot{\sigma}(t)\| dt \tag{1}$$