

L14 A\*

p 76.

main use: "F. Thm of Calc of vars"

$$\text{if } \int_a^b \langle w(t), \delta q(t) \rangle dt = 0$$

$$\forall \delta q \text{ cts sat } \delta q(a) = 0 \\ \delta q(b) = 0$$

$$\text{then } w(t) \equiv 0.$$

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Mechanics on manifolds

replace  $\mathbb{R}^3$  by  $Q$ .

$$L = \frac{1}{2} m |\dot{q}|^2 - V(q) \quad \text{by} \quad L: TQ \rightarrow \mathbb{R}.$$

natural mechanical system:

$$L = \frac{1}{2} \langle \dot{q}, \dot{q} \rangle_q - V(q)$$

Riem metric

in coord:

$$L = \frac{1}{2} g_{\mu\nu}(q) \dot{q}^\mu \dot{q}^\nu$$

. metric. = fiber quad pos def  
form on each  $T_q Q$