inoltre:

$$V \underset{\text{canonico}}{\cong} V^{**}$$

$$V \ni x \longmapsto x^{**} \in V^{**}$$

$x^{**} : \underset{\substack{\Psi \\ v^*}}{V^*} \longrightarrow K$ ed è definito così:

$$x^{**}(v^*) := v^*(x) .$$

In generale:

$$\underbrace{V^* \otimes V^* \dots V^*}_{q} \otimes \underbrace{V \otimes \dots V}_{P} :$$

appl. multilineari da

$$\left\{ T^{i_1 \dots i_p}_{j_1 \dots j_q} \right\} \qquad \underbrace{V \times \dots V}_{q} \times \underbrace{V^* \times \dots V^*}_{P} \to \mathbb{R}$$

NOTAZIONE COMPATTA per i campi tensoriali

$$T = T^I_J \frac{\partial}{\partial x^I} \otimes dx_J$$

$$\frac{\partial}{\partial x^I} = \frac{\partial}{\partial x^{i_1}} \otimes \dots \frac{\partial}{\partial x^{i_p}} \; ; \; dx^J = dx^{i_1} \otimes \dots dx^{i_q}$$

Tensori $(P, q)$

P volte controvarianti

q volte covarianti

Es. $(g_{ij})$ tipo $(0,2)$

$$g : V \times V \to \mathbb{R}$$
$$((v^i), (w^j)) \mapsto g_{ij} v^i w^j$$

$$T = T^I_J \frac{\partial}{\partial x^I} \otimes dx_J$$
$$\parallel$$
$$\tilde{T}^K_L \frac{\partial}{\partial y^K} \otimes dy^L$$

$(v^i)$ tipo $(1,0)$

$(v_i)$ tipo $(0,1)$

$$\Rightarrow \boxed{\hat{T}^K_L = T^I_J \frac{\partial y^K}{\partial x^I} \frac{\partial x^J}{\partial y^L}}$$

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NUOVA