Review

$\wedge$	stacks
$*$	vector calculus
d	$d\vec{r}$
g	orthonormal bases
	signature

$$g(\alpha,\beta) = *(\alpha \wedge *\beta)(-1)^s$$

$$\alpha \wedge *\beta = g(\alpha,\beta)\,\omega$$

$$*1 = \omega$$

$$*\omega = (-1)^s$$

$$** \alpha = (-1)^{s+p(n-p)}\alpha \qquad \left[\alpha \in \wedge^p(\mathbb{R}^n)\right]$$

$$d\vec{r} = \nabla^i \hat{e}_i$$

($\hat{e}_i$: orthonormal)

$$\beta \wedge \alpha = (-1)^{pq}\,\alpha \wedge \beta \qquad [\alpha \in \wedge^p,\ \beta \in \wedge^q]$$

$$d(\alpha \wedge \beta) = d\alpha \wedge \beta + (-1)^p \alpha \wedge d\beta$$

"derivation"

$$d^2 = 0$$

$$\alpha(\vec{v}) = \alpha_i v^i \qquad \alpha = \alpha_i \sigma^i \qquad \vec{v} = v^a \hat{e}_a$$

$$df(\vec{v}) = \vec{v}(f) = v^i \frac{\partial f}{\partial x^i}$$

(v^i: $\vec{v}$; df)