1 Arbitrary p.d. metric

1.1 Assumptions

- $Ind(M) = 0$
- $g = \begin{bmatrix} g_{11} & g_{12} \\ g_{21} & g_{22} \end{bmatrix}$ (**p.d.**)

1.2 General proberties

$\alpha \in \Omega^p(M)$, $\beta \in \Omega^q(M)$, $\gamma \in \Omega^r(M)$

1.2.1 Wedge product $\wedge$

- $\alpha \wedge \beta = (-1)^{pq} \beta \wedge \alpha$ (**anti-/commutativ**)
- **associativ** ($\alpha \wedge \beta \wedge \gamma$)
- $(c_1\alpha + c_2\beta) \wedge \gamma = c_1\alpha \wedge \gamma + c_2\beta \wedge \gamma$ (**bilinear**)

1.3 Wedge product $\wedge$

$f \in \Omega^0(M)$, $\tilde{f} \in \Omega^0(M)$, $\alpha := a_1 dx^1 + a_2 dx^2 \in \Omega^1(M)$, $\beta := b_1 dx^1 + b_2 dx^2 \in \Omega^1(M)$, $\omega := w_{12} dx^1 \wedge dx^2 \in \Omega^2(M)$

- $f\tilde{f} = f \wedge \tilde{f} = \tilde{f} \wedge f \in \Omega^0(M)$
- $f\alpha := f \wedge \alpha = \alpha \wedge f = f a_1 dx^1 + f a_2 dx^2 \in \Omega^1(M)$
- $\alpha \wedge \beta = -\beta \wedge \alpha = (a_1 b_2 - a_2 b_1)\, dx^1 \wedge dx^2 \in \Omega^2(M)$
- $f\omega := f \wedge \omega = \omega \wedge f = f w_{12} dx^1 \wedge dx^2 \in \Omega^2(M)$