$$= \Phi^* i_2 \left(V^1 A_{11} + V^2 A_{12} + V^3 A_{13} \right) \frac{\partial}{\partial y^1}$$
$$\left(V^1 A_{21} + V^2 A_{22} + V^3 A_{23} \right) \frac{\partial}{\partial y^2}$$
$$\left(V^1 A_{31} + V^2 A_{32} + V^3 A_{33} \right) \frac{\partial}{\partial y^3}$$

$$= \Phi^* \left(V^1 A_{11} + V^2 A_{12} + V^3 A_{13} \right) dy^2 \wedge dy^3$$
$$\left(V^1 A_{21} + V^2 A_{22} + V^3 A_{23} \right) dy^3 \wedge dy^1$$
$$\left(V^1 A_{31} + V^2 A_{32} + V^3 A_{33} \right) dy^1 \wedge dy^2$$

$$= \left(V^1 A_{11} + V^2 A_{12} + V^3 A_{13} \right) \left(A_{21} dx^1 + A_{22} dx^2 + A_{23} dx^3 \right) \wedge \left(A_{31} dx^1 + A_{32} dx^2 + A_{33} dx^3 \right)$$
$$\left(V^1 A_{21} + V^2 A_{22} + V^3 A_{23} \right) \left(A_{31} dx^1 + A_{32} dx^2 + A_{33} dx^3 \right) \wedge \left(A_{11} dx^1 + A_{12} dx^2 + A_{13} dx^3 \right)$$
$$\left(V^1 A_{31} + V^2 A_{32} + V^3 A_{33} \right) \left(A_{11} dx^1 + A_{12} dx^2 + A_{13} dx^3 \right) \wedge \left(A_{21} dx^1 + A_{22} dx^2 + A_{23} dx^3 \right)$$

$$= V^1 \{ A_{11} \left(A_{21} dx^1 + A_{22} dx^2 + A_{23} dx^3 \right) \wedge \left(A_{31} dx^1 + A_{32} dx^2 + A_{33} dx^3 \right)$$
$$+ A_{21} \left(A_{31} dx^1 + A_{32} dx^2 + A_{33} dx^3 \right) \wedge \left(A_{11} dx^1 + A_{12} dx^2 + A_{13} dx^3 \right)$$
$$+ A_{31} \left(A_{11} dx^1 + A_{12} dx^2 + A_{13} dx^3 \right) \wedge \left(A_{21} dx^1 + A_{22} dx^2 + A_{23} dx^3 \right) \}$$
$$V^2 \{ A_{12} \left(A_{21} dx^1 + \cdots + A_{23} dx^3 \right) \wedge \left(A_{31} dx^1 + \cdots + A_{33} dx^3 \right)$$
$$+ A_{22} \left(A_{31} dx^1 + \cdots + A_{33} dx^3 \right) \wedge \left(A_{11} dx^1 + \cdots + A_{13} dx^3 \right)$$
$$+ A_{32} \left(A_{11} dx^1 + \cdots + A_{13} dx^3 \right) \wedge \left(A_{21} dx^1 + \cdots + A_{23} dx^3 \right) \}$$
$$V^3 \{ A_{13} (\quad) \wedge (\quad)$$
$$A_{23} (\quad) \wedge (\quad)$$
$$A_{33} (\quad) \wedge (\quad) \}$$