

Ok, a point * point

$$\begin{aligned} & (p_1 \cdot e_{032} + p_1 \cdot e_{013} + p_1 \cdot e_{021} + p_1 \cdot e_{123}) \\ & * (p_2 \cdot e_{032} + p_2 \cdot e_{013} + p_2 \cdot e_{021} + p_2 \cdot e_{123}) \end{aligned}$$

$$\begin{aligned} = & (p_1 \cdot e_{032})(p_2 \cdot e_{123}) e_{01} + (p_1 \cdot e_{013})(p_2 \cdot e_{123}) e_{02} \\ & + (p_1 \cdot e_{021})(p_2 \cdot e_{123}) e_{03} + (p_1 \cdot e_{123})(p_2 \cdot e_{013}) (-e_{02}) \\ & + (p_1 \cdot e_{123})(p_2 \cdot e_{032}) (-e_{01}) + (p_1 \cdot e_{123})(p_2 \cdot e_{021}) (-e_{03}) \\ & + (p_1 \cdot e_{123})(p_2 \cdot e_{123}) (-1) \end{aligned}$$

Group em up:

ω	$-(p_1 \cdot e_{123})(p_2 \cdot e_{123})$
e_{23}	0
e_{31}	0
e_{12}	0
e_{01}	$(p_1 \cdot e_{032})(p_2 \cdot e_{123}) - (p_1 \cdot e_{123})(p_2 \cdot e_{032})$
e_{02}	$(p_1 \cdot e_{013})(p_2 \cdot e_{123}) - (p_1 \cdot e_{123})(p_2 \cdot e_{013})$
e_{03}	$(p_1 \cdot e_{021})(p_2 \cdot e_{123}) - (p_1 \cdot e_{123})(p_2 \cdot e_{021})$
e_{0123}	0