$\vdots \qquad\qquad \vdots$

$= (D_1 f)\,\theta^1 \wedge \dots \theta^p + f \sum_{r=1}^{p} \theta^1 \wedge \dots \wedge D_1(\theta^r) \wedge \dots \wedge \theta^p$

$= D_2 f\, \theta^1 \wedge \dots \theta^p + f \sum_{r=1}^{p} \theta^1 \wedge \dots \wedge D_2(\theta^r) \wedge \dots \wedge \theta^p$

since $D_1(f) = D_2(f)$ and $D_1(\theta) = D_2(\theta)$

$= D_2(f\,\theta^1 \wedge \theta^2 \wedge \dots \wedge \theta^p)$

since $D_1(f) = D_2(f)$ and $D_1(\theta) = D_2(\theta)$

$\therefore D_1(\alpha) = D_2(\alpha)$ for all forms α.

iii) $D(\alpha \wedge \beta) = D_1(D_2(\alpha \wedge \beta)) + D_2(D_1(\alpha \wedge \beta))$

$= D_1(D_2(\alpha) \wedge \beta + (-1)^p \alpha \wedge D_2(\beta))$

$+ D_2(D_1(\alpha) \wedge \beta + (-1)^p \alpha \wedge D_1(\beta))$

If α is a p form, β is a q-form

$D_1(\alpha)$ is a $p+k_1$ form

$D_2(\alpha)$ is a $p+k_2$ form

$D_1(\beta)$ is a $q+k_1$ form

$D_2(\beta)$ is a $q+k_2$ form.

$\Rightarrow D(\alpha \wedge \beta) = D_1 D_2(\alpha) \wedge \beta + (-1)^{p+k_2} D_2(\alpha) \wedge D_1(\beta)$

$+ (-1)^p D_1(\alpha) \wedge D_2(\beta) + (-1)^{2p} \alpha \wedge D_1 D_2(\beta)$

$+ D_2 D_1(\alpha) \wedge \beta + (-1)^{p+k_1} D_1(\alpha) \wedge D_2(\beta)$

$+ (-1)^p D_2(\alpha) \wedge D_1(\beta) + (-1)^{2p} \alpha \wedge D_2 D_1(\beta)$

$= (D_1 D_2(\alpha) \wedge \beta + D_2 D_1(\alpha) \wedge \beta) + (\alpha \wedge D_1 D_2(\beta) + \alpha \wedge D_2 D_1(\beta))$

$+ ((-1)^{p+k_2} D_2(\alpha) \wedge D_1(\beta) + (-1)^p D_1(\alpha) \wedge D_2(\beta)$

$+ (-1)^{p+k_1} D_1(\alpha) \wedge D_2(\beta) + (-1)^p D_2(\alpha) \wedge D_1(\beta))$

$= (D_1 D_2(\alpha) + D_2 D_1(\alpha)) \wedge \beta + \alpha \wedge (D_1 D_2(\beta) + D_2 D_1(\beta))$

$+ (-1)^p ((-1)^{k_2} D_2(\alpha) \wedge D_1(\beta) + D_2(\alpha) \wedge D_1(\beta))$

$+ (-1)^p ((-1)^{k_1} D_1(\alpha) \wedge D_2(\beta) + D_1(\alpha) \wedge D_2(\beta))$