

**Zip** <sub>$\zeta_s$</sub> List@ $\mathbb{E}$  [Q\_, P\_] :=

Module[{ $\zeta$ , z, zs, c, ys,  $\eta_s$ , qt, zrule,  $\zeta$ rule},

zs = Table[ $\zeta^*$ , { $\zeta$ ,  $\zeta_s$ }];

c = Q /. Alternatives @@ ( $\zeta_s \cup zs$ )  $\rightarrow$  0;

ys = Table[ $\partial_{\zeta}$  (Q /. Alternatives @@ zs  $\rightarrow$  0), { $\zeta$ ,  $\zeta_s$ }];

$\eta_s$  = Table[ $\partial_z$  (Q /. Alternatives @@  $\zeta_s \rightarrow$  0), {z, zs}];

qt = Inverse@Table[K $\delta_{z, \zeta^*}$  -  $\partial_{z, \zeta} Q$ , { $\zeta$ ,  $\zeta_s$ }, {z, zs}];

zrule = Thread[zs  $\rightarrow$  qt.(zs + ys)];

$\zeta$ rule = Thread[ $\zeta_s \rightarrow \zeta_s + \eta_s \cdot qt$ ];

Simplify /@

$\mathbb{E}$  [c +  $\eta_s \cdot qt \cdot ys$ , Det[qt] Zip <sub>$\zeta_s$</sub> [P /. (zrule  $\cup$   $\zeta$ rule)]]];