

## Proof of zipping

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$$\begin{aligned}
& \langle \exp(\sum_i y_i + z_i \eta^i + q_j^i z_i) \sum_j \rangle \\
&= \langle \exp(y_i \partial_{z_i}) \exp(z_i \eta^i + q_j^i z_i) \sum_j \rangle \\
&= \langle \exp((z_i + y_i) \eta^i + q_j^i (z_i + y_i)) \sum_j \rangle \\
&= \langle \exp(\eta^i \partial_{z_i}) \exp(y_i \eta^i + q_j^i (z_i + y_i)) \sum_j \rangle \\
&= \langle \exp(y_i \eta_i + q_j^i (z_i + y_i)) (\sum_j + \eta_j) \rangle
\end{aligned}$$


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$$\begin{aligned}
& \langle z_i \sum_j \exp(\sum_k y_k + z_k \eta^k + q_\alpha^k z_k) \rangle \\
&= \langle \partial_{z_i} ( \quad ) \rangle \\
&= \langle \delta_i^j \exp( \quad ) + \sum_j (y_i + q_i^\beta z_\beta) \exp( \quad ) \rangle \\
&\text{by aside} \\
&=
\end{aligned}$$

Aside.

$$\begin{aligned}
\langle z_i \exp( \quad ) \rangle &= \langle \partial_{z_i} \exp( \quad ) \rangle \\
&= \langle (y_i + q_i^\beta z_\beta) \exp( \quad ) \rangle \\
\Rightarrow [z] &= y[1] + Q[z]
\end{aligned}$$

$$\Rightarrow [z] = (I - Q)^{-1} y [1]$$

Similarly, approximately,

$$[j] = (I - Q)^{-1} \eta [1]$$