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In[ ]:= zipq,λ[η-, y-] :=  $\frac{e^{\lambda \eta y / (1-\lambda q)}}{1-\lambda q}$ ;
F[q-, λ-] := Simplify[zipq,λ[q ξ + η, q z + y] eq ξ z + y ξ + η z];
{F[q, λ], F[q, 0], F[q, 1], F[q, 1]} /. {z | ξ → 0} // Simplify
Out[ ]:=  $\left\{ -\frac{e^{\frac{y \xi + q z \xi + z \eta + y \eta \lambda}{1-q \lambda}}}{-1+q \lambda}, e^{y \xi + q z \xi + z \eta}, -\frac{e^{-\frac{y (\xi + \eta) + z (q \xi + \eta)}{-1+q}}}{-1+q}, -\frac{e^{-\frac{y \eta}{-1+q}}}{-1+q} \right\}$ 

In[ ]:= {lhs = ∂λF[q, λ], rhs = ∂ξ∂zF[q, λ], lhs == rhs} // Simplify
Out[ ]:=  $\left\{ -\frac{1}{(-1+q \lambda)^3} e^{\frac{y \xi + q z \xi + z \eta + y \eta \lambda}{1-q \lambda}} (y \eta + q (1 + y \xi + z \eta) + q^2 (z \xi - \lambda)), \right.$ 
 $\left. -\frac{1}{(-1+q \lambda)^3} e^{\frac{y \xi + q z \xi + z \eta + y \eta \lambda}{1-q \lambda}} (y \eta + q (1 + y \xi + z \eta) + q^2 (z \xi - \lambda)), \text{True} \right\}$ 

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