```mathematica
In[◦]:= Quit[];
```

```mathematica
In[1]:= f1[x_, y_] := -x + C₁ ξ[x, y]² η[x, y] + C₂ ξ[x, y]² + C₃ ξ[x, y] +
          C₄ ξ[x, y] η[x, y]² + C₅ η[x, y]² + C₆ η[x, y] + C₇ ξ[x, y] × η[x, y] + C₈;
        f2[x_, y_] := -y + D₁ ξ[x, y]² η[x, y] + D₂ ξ[x, y]² + D₃ ξ[x, y] +
          D₄ ξ[x, y] η[x, y]² + D₅ η[x, y]² + D₆ η[x, y] + D₇ ξ[x, y] × η[x, y] + D₈;
```

```mathematica
In[4]:= D[f1[x, y], x]
```

$$Out[4]= -1 + C_3\, \xi^{(1,0)}[x, y] + 2\, C_2\, \xi[x, y]\, \xi^{(1,0)}[x, y] + C_7\, \eta[x, y]\, \xi^{(1,0)}[x, y] +$$
$$2\, C_1\, \xi[x, y] \times \eta[x, y]\, \xi^{(1,0)}[x, y] + C_4\, \eta[x, y]^2\, \xi^{(1,0)}[x, y] +$$
$$C_6\, \eta^{(1,0)}[x, y] + C_7\, \xi[x, y]\, \eta^{(1,0)}[x, y] + C_1\, \xi[x, y]^2\, \eta^{(1,0)}[x, y] +$$
$$2\, C_5\, \eta[x, y]\, \eta^{(1,0)}[x, y] + 2\, C_4\, \xi[x, y] \times \eta[x, y]\, \eta^{(1,0)}[x, y]$$

```mathematica
In[5]:= D[f2[x, y], x]
```

$$Out[5]= D_3\, \xi^{(1,0)}[x, y] + 2\, D_2\, \xi[x, y]\, \xi^{(1,0)}[x, y] + D_7\, \eta[x, y]\, \xi^{(1,0)}[x, y] +$$
$$2\, D_1\, \xi[x, y] \times \eta[x, y]\, \xi^{(1,0)}[x, y] + D_4\, \eta[x, y]^2\, \xi^{(1,0)}[x, y] +$$
$$D_6\, \eta^{(1,0)}[x, y] + D_7\, \xi[x, y]\, \eta^{(1,0)}[x, y] + D_1\, \xi[x, y]^2\, \eta^{(1,0)}[x, y] +$$
$$2\, D_5\, \eta[x, y]\, \eta^{(1,0)}[x, y] + 2\, D_4\, \xi[x, y] \times \eta[x, y]\, \eta^{(1,0)}[x, y]$$

```mathematica
In[6]:= D[f1[x, y], y]
```

$$Out[6]= C_3\, \xi^{(0,1)}[x, y] + 2\, C_2\, \xi[x, y]\, \xi^{(0,1)}[x, y] + C_7\, \eta[x, y]\, \xi^{(0,1)}[x, y] +$$
$$2\, C_1\, \xi[x, y] \times \eta[x, y]\, \xi^{(0,1)}[x, y] + C_4\, \eta[x, y]^2\, \xi^{(0,1)}[x, y] +$$
$$C_6\, \eta^{(0,1)}[x, y] + C_7\, \xi[x, y]\, \eta^{(0,1)}[x, y] + C_1\, \xi[x, y]^2\, \eta^{(0,1)}[x, y] +$$
$$2\, C_5\, \eta[x, y]\, \eta^{(0,1)}[x, y] + 2\, C_4\, \xi[x, y] \times \eta[x, y]\, \eta^{(0,1)}[x, y]$$

```mathematica
In[7]:= D[f2[x, y], y]
```

$$Out[7]= -1 + D_3\, \xi^{(0,1)}[x, y] + 2\, D_2\, \xi[x, y]\, \xi^{(0,1)}[x, y] + D_7\, \eta[x, y]\, \xi^{(0,1)}[x, y] +$$
$$2\, D_1\, \xi[x, y] \times \eta[x, y]\, \xi^{(0,1)}[x, y] + D_4\, \eta[x, y]^2\, \xi^{(0,1)}[x, y] +$$
$$D_6\, \eta^{(0,1)}[x, y] + D_7\, \xi[x, y]\, \eta^{(0,1)}[x, y] + D_1\, \xi[x, y]^2\, \eta^{(0,1)}[x, y] +$$
$$2\, D_5\, \eta[x, y]\, \eta^{(0,1)}[x, y] + 2\, D_4\, \xi[x, y] \times \eta[x, y]\, \eta^{(0,1)}[x, y]$$

In[8]:= `(* to get dζ/dx and dη/dx *)`
`Solve[D[f1[x, y], x] == 0 && D[f2[x, y], x] == 0, {ζ`$^{(1,0)}$`[x, y], η`$^{(1,0)}$`[x, y]}]`

Out[8]= $\{\{ζ^{(1,0)}[x, y] \rightarrow -\big(\big(D_6 + D_7\, ζ[x, y] + D_1\, ζ[x, y]^2 + 2\, D_5\, η[x, y] + 2\, D_4\, ζ[x, y] \times η[x, y]\big)\,\big/$
$\big(-\big(D_6 + D_7\, ζ[x, y] + D_1\, ζ[x, y]^2 + 2\, D_5\, η[x, y] + 2\, D_4\, ζ[x, y] \times η[x, y]\big)$
$\big(C_3 + 2\, C_2\, ζ[x, y] + C_7\, η[x, y] + 2\, C_1\, ζ[x, y] \times η[x, y] + C_4\, η[x, y]^2\big) +$
$\big(C_6 + C_7\, ζ[x, y] + C_1\, ζ[x, y]^2 + 2\, C_5\, η[x, y] + 2\, C_4\, ζ[x, y] \times η[x, y]\big)$
$\big(D_3 + 2\, D_2\, ζ[x, y] + D_7\, η[x, y] + 2\, D_1\, ζ[x, y] \times η[x, y] + D_4\, η[x, y]^2\big)\big)\big),$
$η^{(1,0)}[x, y] \rightarrow -\big(\big(-D_3 - 2\, D_2\, ζ[x, y] - D_7\, η[x, y] - 2\, D_1\, ζ[x, y] \times η[x, y] - D_4\, η[x, y]^2\big)\,\big/$
$\big(C_6\, D_3 - C_3\, D_6 + 2\, C_6\, D_2\, ζ[x, y] + C_7\, D_3\, ζ[x, y] - 2\, C_2\, D_6\, ζ[x, y] - C_3\, D_7\, ζ[x, y] -$
$C_3\, D_1\, ζ[x, y]^2 + 2\, C_7\, D_2\, ζ[x, y]^2 + C_1\, D_3\, ζ[x, y]^2 - 2\, C_2\, D_7\, ζ[x, y]^2 - 2\, C_2\, D_1\, ζ[x, y]^3 +$
$2\, C_1\, D_2\, ζ[x, y]^3 + 2\, C_5\, D_3\, η[x, y] - 2\, C_3\, D_5\, η[x, y] - C_7\, D_6\, η[x, y] + C_6\, D_7\, η[x, y] +$
$2\, C_6\, D_1\, ζ[x, y] \times η[x, y] + 4\, C_5\, D_2\, ζ[x, y] \times η[x, y] + 2\, C_4\, D_3\, ζ[x, y] \times η[x, y] -$
$2\, C_3\, D_4\, ζ[x, y] \times η[x, y] - 4\, C_2\, D_5\, ζ[x, y] \times η[x, y] - 2\, C_1\, D_6\, ζ[x, y] \times η[x, y] +$
$C_7\, D_1\, ζ[x, y]^2\, η[x, y] + 4\, C_4\, D_2\, ζ[x, y]^2\, η[x, y] - 4\, C_2\, D_4\, ζ[x, y]^2\, η[x, y] -$
$C_1\, D_7\, ζ[x, y]^2\, η[x, y] + C_6\, D_4\, η[x, y]^2 - 2\, C_7\, D_5\, η[x, y]^2 - C_4\, D_6\, η[x, y]^2 +$
$2\, C_5\, D_7\, η[x, y]^2 + 4\, C_5\, D_1\, ζ[x, y]\, η[x, y]^2 - C_7\, D_4\, ζ[x, y]\, η[x, y]^2 -$
$4\, C_1\, D_5\, ζ[x, y]\, η[x, y]^2 + C_4\, D_7\, ζ[x, y]\, η[x, y]^2 + 3\, C_4\, D_1\, ζ[x, y]^2\, η[x, y]^2 -$
$3\, C_1\, D_4\, ζ[x, y]^2\, η[x, y]^2 + 2\, C_5\, D_4\, η[x, y]^3 - 2\, C_4\, D_5\, η[x, y]^3\big)\big)\}\}$

In[9]:= `(* to get dζ/dy and dη/dy *)`
`Solve[D[f1[x, y], y] == 0 && D[f2[x, y], y] == 0, {ζ`$^{(0,1)}$`[x, y], η`$^{(0,1)}$`[x, y]}]`

Out[9]= $\{\{ζ^{(0,1)}[x, y] \rightarrow -\big(\big(-C_6 - C_7\, ζ[x, y] - C_1\, ζ[x, y]^2 - 2\, C_5\, η[x, y] - 2\, C_4\, ζ[x, y] \times η[x, y]\big)\,\big/$
$\big(-\big(D_6 + D_7\, ζ[x, y] + D_1\, ζ[x, y]^2 + 2\, D_5\, η[x, y] + 2\, D_4\, ζ[x, y] \times η[x, y]\big)$
$\big(C_3 + 2\, C_2\, ζ[x, y] + C_7\, η[x, y] + 2\, C_1\, ζ[x, y] \times η[x, y] + C_4\, η[x, y]^2\big) +$
$\big(C_6 + C_7\, ζ[x, y] + C_1\, ζ[x, y]^2 + 2\, C_5\, η[x, y] + 2\, C_4\, ζ[x, y] \times η[x, y]\big)$
$\big(D_3 + 2\, D_2\, ζ[x, y] + D_7\, η[x, y] + 2\, D_1\, ζ[x, y] \times η[x, y] + D_4\, η[x, y]^2\big)\big)\big),$
$η^{(0,1)}[x, y] \rightarrow -\big(\big(C_3 + 2\, C_2\, ζ[x, y] + C_7\, η[x, y] + 2\, C_1\, ζ[x, y] \times η[x, y] + C_4\, η[x, y]^2\big)\,\big/$
$\big(C_6\, D_3 - C_3\, D_6 + 2\, C_6\, D_2\, ζ[x, y] + C_7\, D_3\, ζ[x, y] - 2\, C_2\, D_6\, ζ[x, y] - C_3\, D_7\, ζ[x, y] -$
$C_3\, D_1\, ζ[x, y]^2 + 2\, C_7\, D_2\, ζ[x, y]^2 + C_1\, D_3\, ζ[x, y]^2 - 2\, C_2\, D_7\, ζ[x, y]^2 - 2\, C_2\, D_1\, ζ[x, y]^3 +$
$2\, C_1\, D_2\, ζ[x, y]^3 + 2\, C_5\, D_3\, η[x, y] - 2\, C_3\, D_5\, η[x, y] - C_7\, D_6\, η[x, y] + C_6\, D_7\, η[x, y] +$
$2\, C_6\, D_1\, ζ[x, y] \times η[x, y] + 4\, C_5\, D_2\, ζ[x, y] \times η[x, y] + 2\, C_4\, D_3\, ζ[x, y] \times η[x, y] -$
$2\, C_3\, D_4\, ζ[x, y] \times η[x, y] - 4\, C_2\, D_5\, ζ[x, y] \times η[x, y] - 2\, C_1\, D_6\, ζ[x, y] \times η[x, y] +$
$C_7\, D_1\, ζ[x, y]^2\, η[x, y] + 4\, C_4\, D_2\, ζ[x, y]^2\, η[x, y] - 4\, C_2\, D_4\, ζ[x, y]^2\, η[x, y] -$
$C_1\, D_7\, ζ[x, y]^2\, η[x, y] + C_6\, D_4\, η[x, y]^2 - 2\, C_7\, D_5\, η[x, y]^2 - C_4\, D_6\, η[x, y]^2 +$
$2\, C_5\, D_7\, η[x, y]^2 + 4\, C_5\, D_1\, ζ[x, y]\, η[x, y]^2 - C_7\, D_4\, ζ[x, y]\, η[x, y]^2 -$
$4\, C_1\, D_5\, ζ[x, y]\, η[x, y]^2 + C_4\, D_7\, ζ[x, y]\, η[x, y]^2 + 3\, C_4\, D_1\, ζ[x, y]^2\, η[x, y]^2 -$
$3\, C_1\, D_4\, ζ[x, y]^2\, η[x, y]^2 + 2\, C_5\, D_4\, η[x, y]^3 - 2\, C_4\, D_5\, η[x, y]^3\big)\big)\}\}$