Derivative exists if (13)

$$\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y} \quad \text{and} \quad \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$$

$u = y$, $v = x$

$$\frac{\partial u}{\partial x} = 0 = \frac{\partial v}{\partial y}, \quad \frac{\partial u}{\partial y} = 1 \neq -1 = \frac{\partial v}{\partial x}$$

$\therefore f$ not differentiable