John Nash Problem

Show that given any infinitely differentiable functions $M(x,y,z), N(x,y,z), P(x,y,z)$ on $\mathbb{R}^3\backslash\{0\}$ satisfying

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}, \quad \frac{\partial M}{\partial z} = \frac{\partial P}{\partial x}, \quad \frac{\partial N}{\partial z} = \frac{\partial P}{\partial y}$$

there exists a differentiable function $H(x,y,z)$ on $\mathbb{R}^3\backslash\{0\}$ such that

$$\frac{\partial H}{\partial x} = M, \frac{\partial H}{\partial y} = N, \frac{\partial H}{\partial z} = P.$$