**(a)** Define $g : \mathbb{R}^2 \to \mathbb{R}^2$ as $g(x, y) = (f(x, y), y)$. The differential is then

$$g'(x,y) = \begin{pmatrix} D_1 f(x,y) & D_2 f(x,y) \\ 0 & 1 \end{pmatrix}$$

and so $\det g'(x, y) = D_1 f(x, y)$. Now, if $f$ is $1 - 1$, then there must exist some point $(a, b)$ at which $\det g'(a, b) \neq 0$.

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