2. $f(z) = |z|^2$.

$w = f(z) = u + iv = |z|^2$.

comparing Both sides,

$u = x^2 + y^2$, $\frac{\partial u}{\partial x} = 2x$, $\frac{\partial u}{\partial y} = 2y$

$v = 0$, $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y} = 0$

using C-R eq^n.

$\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y} \Rightarrow 2x = 0 \Rightarrow x = 0$

$\frac{\partial u}{\partial y} = \frac{-\partial v}{\partial x} \Rightarrow 2y = 0$

$\Rightarrow y = 0$

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