Computing the Divergence and Curl in Polar Coordinates

Let $\boldsymbol{u}$ be a two-dimensional vector field given in polar coordinates by

$$\boldsymbol{u} = \frac{1}{r}\left(k_1\hat{\boldsymbol{r}} + k_2\hat{\boldsymbol{\theta}}\right),$$

where k_1 and k_2 are constants. For $r \neq 0$,

determine $\boldsymbol{\nabla} \cdot \boldsymbol{u}$ and $\boldsymbol{\nabla} \times \boldsymbol{u}$.

Completed

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