Bendixson's negative criterion

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Let

$$\dot{\mathbf{x}} = \mathbf{f}(\mathbf{x})$$

be a planar system where $\mathbf{f} = (\mathbf{X}, \mathbf{Y})^t$ and $\mathbf{x} = (x, y)^t$. Furthermore $\mathbf{f} \in C^1(E)$ where E is a simply connected region of the plane. If $\frac{\partial \mathbf{X}}{\partial x} + \frac{\partial \mathbf{Y}}{\partial y}$ (the *divergence of the vector field $\mathbf{f}$, $\nabla \cdot \mathbf{f}$*) is always of the same sign but not identically zero then there are no periodic solution in the region E of the planar system.