Lineability of the set of holomorphic mappings with dense range
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Let $\mathbb{D}$ be the open unit disc in $\mathbb{C}$. Let $E$ be a separable Banach space and let $B_E$ be the open unit ball of $E$. At the Conference on Infinite Dimensional Holomorphy held at the University of Kentucky in 1973, D. Patil asked whether there exist holomorphic mappings $f : \mathbb{D} \to B_E$ such that $f(\mathbb{D})$ is dense in $B_E$. In 1976, R. M. Aron obtained a positive answer to this question. At the same time, J. Globevnik and W. Rudin independently proved that the result also holds if the ball $B_E$ is replaced by any connected open subset $U$ of $E$. We will study the set

$$\{ f \in \mathcal{H}(\mathbb{D}, U) : f(\mathbb{D}) \text{ is dense in } U \}$$

of holomorphic mappings with dense range. We will prove the lineability and density of this set for different choices of $U \subset E$.

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