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Holomorphic Extension-Interpolation

The following is essentially the sheaf property of holomorphic functions.

Theorem. A function $f : U \to \mathbb{C}$ defined on an open set $U \subset \mathbb{C}^n$ is holomorphic if it is holomorphic in a neighborhood of each point of U.

The next theorem is the famous theorem of Hartogs on separate holomorphy.

Theorem. A function $f : U \to \mathbb{C}$ defined on an open set $U \subset \mathbb{C}^n$ is holomorphic if, for each complex line ℓ in a coordinate direction, the restriction of f to $\ell \cap U$ is holomorphic.

Our purpose is to find analogous results when the open set is replaced by an arbitrary subset E of $\mathbb{C}$ or, more generally, of a one-dimensional complex analytic subset of $\mathbb{C}^n$.