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# Reinhardt domain

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**Definition.** We call an open set $G \subset \mathbb{C}^n$ a *Reinhardt domain* if $(z_1, \ldots, z_n) \in G$ implies that $(e^{i\theta_1} z_1, \ldots, e^{i\theta_n} z_n) \in G$ for all real $\theta_1, \ldots, \theta_n$.

The reason for studying these kinds of domains is that `http://planetmath.org/Logarithmical` convex Reinhardt domain are the domains of convergence of power series in several complex variables. Note that in one complex variable, a Reinhardt domain is just a disc.

Note that the intersection of Reinhardt domains is still a Reinhardt domain, so for every Reinhardt domain, there is a smallest Reinhardt domain which contains it.

**Theorem.** *Suppose that $G$ is a Reinhardt domain which contains 0 and that $\tilde{G}$ is the smallest Reinhardt domain such that $G \subset \tilde{G}$. Then any function holomorphic on $G$ has a holomorphic to $\tilde{G}$.*

It actually turns out that a Reinhardt domain is a domain of convergence.

examples of Reinhardt domains in $\mathbb{C}^n$ are polydiscs such as $\underbrace{\mathbb{D} \times \cdots \times \mathbb{D}}_{n}$ where $\mathbb{D} \subset \mathbb{C}$ is the unit disc.

# References


[1] Lars Hörmander. , North-Holland Publishing Company, New York, New York, 1973.

[2] Steven G. Krantz. , AMS Chelsea Publishing, Providence, Rhode Island, 1992.