



Math for the people, by the people.

germ

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Definition 1 (Germ). Let M and N be manifolds and $x \in M$. We consider all smooth mappings $f : U_f \rightarrow N$, where U_f is some open neighborhood of x in M . We define an equivalence relation on the set of mappings considered, and we put $f \underset{x}{\sim} g$ if there is some open neighborhood V of x with $f|_V = g|_V$. The equivalence class of a mapping f is called the *germ of f at x* , denoted by \overline{f} or, sometimes, $\text{germ}_x f$, and we write

$$\overline{f} : (M, x) \rightarrow (N, f(x))$$

Remark 1. Germs arise naturally in differential topology. It is very convenient when dealing with derivatives at the point x , as every mapping in a germ will have the same derivative values and properties in x , and hence can be identified for such purposes: every mapping in a germ gives rise to the same *tangent vector* of M at x .