



Math for the people, by the people.

## recurrent point

Canonical name	RecurrentPoint
Date of creation	2013-03-22 14:29:53
Last modified on	2013-03-22 14:29:53
Owner	Koro (127)
Last modified by	Koro (127)
Numerical id	10
Author	Koro (127)
Entry type	Definition
Classification	msc 37B20
Related topic	NonwanderingSet
Defines	recurrent set

Let  $X$  be a Hausdorff space and  $f: X \rightarrow X$  a function. A point  $x \in X$  is said to be *recurrent* (for  $f$ ) if  $x \in \omega(x)$ , i.e. if  $x$  belongs to its  $\omega$ -<http://planetmath.org/OmegaLimitSet3>limit set. This means that for each neighborhood  $U$  of  $x$  there exists  $n > 0$  such that  $f^n(x) \in U$ .

The closure of the set of recurrent points of  $f$  is often denoted  $R(f)$  and is called the *recurrent set* of  $f$ .

Every recurrent point is a nonwandering point, hence if  $f$  is a homeomorphism and  $X$  is compact,  $R(f)$  is an invariant subset of  $\Omega(f)$ , which may be a proper subset.