

Re: Local Homeomorphisms

Source: <http://sci.tech-archive.net/Archive/sci.math/2008-04/msg03135.html>

- *From:* Jannick Asmus <jannick.news@xxxxxx>
 - *Date:* Thu, 17 Apr 2008 10:42:00 +0200
-

On 17.04.2008 09:26, William Elliot wrote:

On Wed, 16 Apr 2008, Jannick Asmus wrote:

On 16.04.2008 10:18, William Elliot wrote:

Let $f: X \rightarrow Y$ be a local homeomorphism.

If X is connected, then is f a homeomorphism?

No. Counterexample: $C \rightarrow C \setminus \{0\}$, $z \rightarrow \exp(z)$;

$f: C \rightarrow C \setminus \{0\}$, $z \rightarrow e^z$

I meant $z \rightarrow e^z$.

is a single counter example?

No. To provide a far simpler one: $Z \rightarrow Z$, $x \rightarrow 0$, Z equipped with the discrete topology.

I didn't know that you want to count counter examples. ;)

$C \setminus \{0\} \rightarrow C \setminus \{0\}$, $z \rightarrow z^k$
($k > 1$) or any topological covering.

$g: C \setminus \{0\} \rightarrow C \setminus \{0\}$, $z \rightarrow z^k$, $k > 1$

is another counter example?

What don't you understand here? Did you check that it is a local homeomorphism?

Re: Local Homeomorphisms

Don't understand "or any topological covering".

I am so sorry for my bad English, I just literally translated the expression from my mother tongue. I meant a topological covering `_map_`.

If U, V are open and U homeomorphic $f(U)$, V
homeomorphic $f(V)$,
is not $U \vee V$ homeomorphic to $f(U) \vee f(V) = f(U \vee V)$?

No. Patch examples above.

I'm to use f or g as an counter example?

"Patch" means to find U and V and show the patch $U \vee V$ fails?

Sorry about the confusion. Yes – if you mean to take **one** of the counter examples above and patch two open subsets U and V such that the map on $U \cup V$ is **not** injective.

Not even if U and V are overlapping?

Do not know what you are saying here. I suspect that you were not having the counter examples above in mind when you said this.

Anyway, best wishes,

J.

.