Does not suffice to run `latex` a finite number of times to get cross-references right

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Abstract

We present a LaTeX file such that a cross-reference is wrong no matter how many times we run `latex`.

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It is well-known that we need to run `latex` several times to get cross-references right. This raises a natural question for mathematicians: for any LaTeX file suffices to run `latex` a finite number of times? We show that the answer is negative by a counterexample: the LaTeX file

```
1 \documentclass{article} \usepackage{forloop}
2 \begin{document}
3   \newcounter{n} \forloop{n}{0}{\value{n} < \pageref{l}}{~\newpage}
4   Last-page label here\label{l}. Label value: \pageref{l}.
5 \end{document}
```

is such that the cross-reference `\pageref{l}` is wrong no matter how many times we run `latex`. This file uses a little diabolic trick: a label `l` is created in the last page (line 4) and there are created (resorting to a for loop) `\pageref{l}` many new pages (line 3), causing the document to have `\pageref{l}` + 1 pages, so the cross-reference `\pageref{l}` to the last page is wrong. (At `http://tex.stackexchange.com/questions/30674/document-requiring-infinitely-many-compiler-passes` there is an even more diabolic counterexample that avoids a for loop.)

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