

Whose Limit is It Anyway?

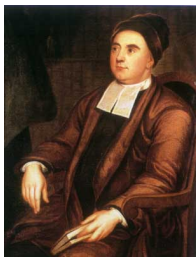
Does $\lim_{x \rightarrow 0} \sqrt{x}$ exist?

Whose Limit is It Anyway?

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$\forall \epsilon > 0 \exists \delta > 0$ so that $|f(x)| < \epsilon$ whenever $0 < |x| < \delta$ is only valid for those functions whose domains contain a deleted neighborhood of the point.

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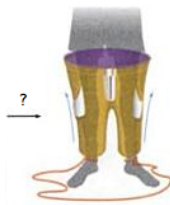


In 1734 Bishop Berkeley wrote the pamphlet: *The Analyst, or a Discourse Addressed to an Infidel Mathematician, wherein it is examined whether the object, principles and influences of the modern analysis are more deduced than religious mysteries and points of faith.*

I have no controversy about your conclusions, but only about your logic and method. How do you demonstrate? What objects are you conversant with, and whether you conceive them clearly? What principles you proceed upon; how sound they may be; and how you apply them?

Pants Research [Get your Knickers in a Bunch]

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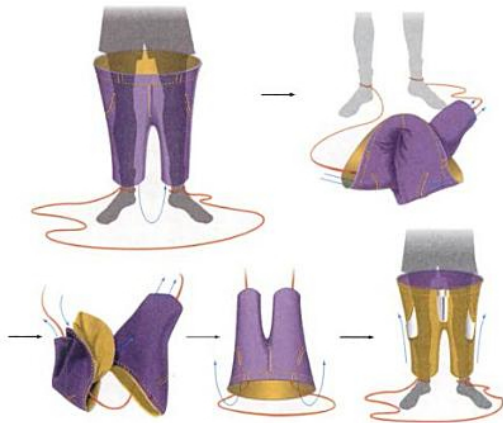


Heart of Mathematics by Burger and Starbird

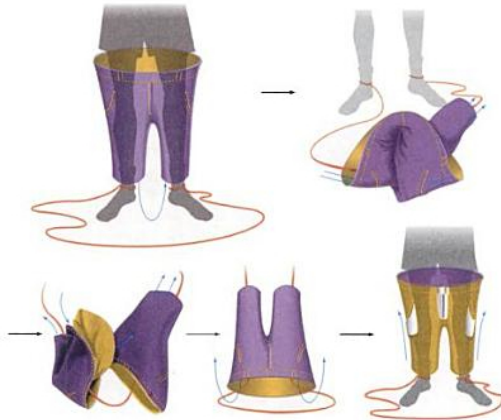
Beginning with this initial state, is it possible to reach this final state? Demonstrate how or prove why it is not possible.



One Solution



One Solution



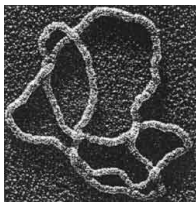
Write up a solution so that someone who was not here could understand.

One Solution

- Pull pants down so that they are on the rope.
- Bring the cuff of the right pants leg through the inside of the left pants leg and pull all the way through. The pants will still be right side out but the rope will now go through the pants.
- Now reach each hand into the inside of each pants leg and grab the cuffs. Simultaneously pull the cuffs up through the pants. The pants will be inside out and the rope will no longer be around the pants.
- Pull the pants up.

Research Perspectives: Pants

- *Make the issue concrete and physical whenever possible.... Many surprising and even counterintuitive discoveries can be made by freeing ourselves from old, unsubstantiated biases and experimenting with new ways of thinking and seeing.*
- Shared process of creative inquiry and problem solving
- Equivalences in mathematics and molecular biology (topology, knot theory, and what kind of enzymatic reactions take place for mRNA strands)



[upon losing the use of his right eye] *Now I will have less distraction.*
Quoted in H Eves In Mathematical Circles (Boston 1969).



Leonhard Euler

If a nonnegative quantity was so small that it is smaller than any given one, then it certainly could not be anything but zero. To those who ask what the infinitely small quantity in mathematics is, we answer that it is actually zero. Hence there are not so many mysteries hidden in this concept as they are usually believed to be. These supposed mysteries have rendered the calculus of the infinitely small quite suspect to many people. Those doubts that remain we shall thoroughly remove in the following pages, where we shall explain this calculus.



Walk through the city and cross each bridge once & only once.



- Continuity still problem in 1800s
- Topology and real analysis resolved many definitions of limit in calculus - one definition in topology
- 1850 Benedict Listing used the term topology
- 1870s onward mark most of the ideas in this class
- One could say that topological spaces are the objects for which continuous functions can be defined.

Samuel Bruce Smith: *The axiomatic rigor that makes topology a model and solid foundation for other fields is precisely the characteristic that makes it a difficult fit for the undergraduate curriculum.... One of the great advantages of topology is the almost visual elegance of its formalism.*

