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Surprising simple geometries.

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From the text: It may seem obvious that a continuous curve that can be inscribed by some simple figure of finite area must be of finite length and, if it is closed, it may seem obvious that its interior must have a positive finite area. What if we build a figure iterating some infinite process but still being constrained in some finite space? Somebody could think that we would just approximate some kind of limit curve that must preserve a finite length and a positive area. Moreover one could think that it would be difficult to extrapolate the area and the length of such curves analytically, at least only using elementary analysis concepts. We would like to show that all this intuition is in principle false and that there are some really simple and astounding counterexamples. In the few pages that follow, we want to present to you an uncommon way to describe and use some elementary analytical tools. Sometimes it may be hard to motivate students to study (geometric) series and limits and it can he hard for them to accept and understand the bizarre behaviour of mathematical infinity, thus it could be interesting to show how some particular geometries can be described easily using these tools. Despite their simplicity these topics are related to many beautiful mathematical questions, most of which are particularly old, simple and elegant but nevertheless still open. If this is not enough, many actual technological improvements are based on them and the simple examples that we are going to describe. This is something that could give the students reasons to study mathematics and physics.

Classification: I90 G90
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