

# Non-zero gaps between real numbers

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The definition of real numbers allows one to find a real number between any two given different real numbers. If one uses this to assert that there is no non-zero extent gap devoid of real numbers in it, then I think it is not a complete proof but just an assertion. Because a complete proof would require one to find two different real numbers with zero gap between them. Since this is not possible, one could also say that the gaps are never filled by real numbers.

Since none of these "half-proof"s is more valid than the other, I don't see why we should dismiss one in the favor of the other.

Actually, by assuming that real numbers can fill the continuum, we are entering into an unknown realm and forced to prove that zero extent points can fill the finite interval in continuum.

On the other hand, there is no ambiguity in accepting non-zero gaps. Since we could never find adjacent numbers with zero gap, there is no harm in stopping at infinitesimal level and take it is the model of an extent. This persistence of non-zero extent is safe to stick to, and it reflects extent in a fractal sense, without collapsing to zero at any level.

I think we have collapsed things to points because someone didn't like the never-ending recursion seen in the forms such as fractals, and wanted to nail down things to zero, which is sad.

I don't think we should purge infinitesimals which seem more sensible than the argument of points making up the space.

– venkat

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