

An Investigation into Wondrous Numbers

Pick any number. To make it easy on yourself, pick one between 10 and 50. If the number is ODD, then multiply it by three and add 1. If the number is EVEN then halve it. Repeat the process with your new number.

eg 12 -> 6 -> 3 -> 10 -> 5 -> 16 -> 8 -> 4 -> 2 -> 1 -> 4 -> 2 -> 1 -> etc.

What eventually happens with your number. Investigate different numbers? Try starting with 27, 73 or 97.

Analysis

It is conjectured that all numbers will terminate in the sequence 4->2->1 which then repeats. Using a spreadsheet to plot the outcomes of all numbers under 13256 gives:

- ◆ 27 continues for 111 terms
- ◆ 73 continues for 115 terms
- ◆ 97 continues for 118 terms
- ◆ 649 continues for 144 terms
- ◆ 703 continues for 170 terms
- ◆ 937 continues for 173 terms
- ◆ 967 continues for 142 terms
- ◆ 1161 continues for 181 terms
- ◆ 2322 continues for 182 terms
- ◆ 2463 continues for 208 terms
- ◆ 2919 continues for 216 terms
- ◆ 3711 continues for 237 terms
- ◆ 6171 continues for 261 terms
- ◆ 10971 continues for 267 terms
- ◆ 13255 continues for 275 terms

Commentary

This is an example of a property in number theory for which no terminating test is currently known. It is further conjectured that no terminating test can be known. We thus may have a property that is true but not provable. The existence of true but unprovable theorems is itself proved but the existence proof doesn't tell us which ones fall into this category. If the property is true but not provable, we will not be able to prove that it is not provable. That is mathematicians may just have to keep searching for a proof, never finding one but never being able to prove that one does not exist. In this particular example, the numbers keep sailing up into an infinite sky, sometimes drifting back down temporarily, until eventually hitting one number in the sequence, 1 2 4 8 16 32. As this sequence continues to infinity, and we can keep sailing up for a potentially infinite number of terms, it seems not unreasonable that eventually the two will coincide at some point. Others might say that it is plausible that you could keep sailing up forever. Who knows? Does God know the unknowable? ∞ rg

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